

TAXONOMIC STUDIES ON THE GENUS TIMOCRATICA
(LEPIDOPTERA: OECOPHORIDAE)

by

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Abstract

Taxonomic studies on the genus Timocratica (Lepidoptera: Oecophoridae)

The Neotropical genus Timocratica is revised. Keys, maps of geographical and ecological distribution, and illustrations of the genitalia of both sexes are provided for all species. Arrangements of the species based on cladistic and numerical methods are also presented. Biological data and descriptions of the larvae and pupae are also included for two species: palpalis (Zeller) and melanocosta sp. n. Lychnocrates Meyrick is retained as synonym of Timocratica. Forty seven species are recognized, including seven which are described and illustrated but not named due to lack of sufficient material. Seventeen new species are described: guarani (Argentina, Paraguay), agramma, albitogata, bicornuta, melanocosta, melanostriga, nivea, parvileuca, venifurcata (Brazil), meridionalis (Bolivia, Brazil, Paraguay), longicilia (Colombia), parvifusca (Costa Rica), constrictivalva (Ecuador), xanthotarsa (Panama), spinignatha, titanoleuca (Peru), and fuscipalpalis (Venezuela). A new subspecies of xanthosoma: leucocephala (Colombia, Panama) is also described. T. amseli Duckworth is removed from the synonymy of xanthosoma (Dognin), and butyrota (Meyrick) comb. n., is transferred from Stenoma Zeller. Seven names previously included in Timocratica are retained in Stenoma: completella (Walker), liniella Busck and cantatrix Meyrick (= convexicostata (Zeller) comb. n.), grandaeva (Zeller) comb. n., sexmaculata (Dognin) comb. n., staudingerana (Maassen) comb. n., and tristrigata (Zeller) comb. n. Eleven new synonyms are recognized: syndicastis Meyrick (= butyrota (Meyrick)), haywardi Busck (= palpalis (Zeller)), stomatocosma Meyrick (= subovalis (Meyrick)), claudescens Meyrick, crassa Meyrick and isographa Meyrick (= monotonia (Strand)), liniella Busck and cantatrix Meyrick (= convexicostata (Zeller)), and contophora Meyrick and heterosema Meyrick (= staudingerana (Maassen)).

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Introduction

This work began with the need to identify species of white Stenominae moths whose larvae damage timber, fruit and ornamental trees in Brazil and Argentina.

For over half a century bark feeding larvae of these Stenommatinae have been found and bred from different localities in Brazil, being consistently referred to in the Brazilian literature as Stenoma albella (Zeller) or Timocratica albella (Zeller). The association of these names with the pest first occurred in two works by Bondar (1912, 1913) and then became established in the economic literature through wide use of and reference to the three editions of Lima's catalogues (1922, 1928, 1936) and through his use of the name Timocratica albella (Zeller) in the section on Lepidoptera in his series on the insects of Brazil (Lima, 1945).

In the 1930s Hayward bred series of a similar insect whose larvae were found causing damage to several species of fruit trees in Argentina. Busck (1938) described Timocratica haywardi from this series as a new species, naming it after the collector. Much later, Hayward (1969) synonymized this name with T. auxoleuca (Meyrick) without giving any reason for it, though he probably compared the excellent genitalia illustrations of haywardi presented by Busck with those of auxoleuca published by Clarke (1955). Nevertheless, both Hayward and Clarke were not aware that Meyrick (1926) had already synonymized his auxoleuca with palpalis (Zeller). Therefore, at least four names

albella, auxoleuca, haywardi and palpalis— were associated with the pest species, not including the names of another fifteen similarly white species described mainly by Meyrick.

The genus Timocratica was proposed by Meyrick in 1912 to accomodate his fuscous species isographa, and also (conditionally) tristrigata Zeller and major Busck. Meyrick later described three more species in this genus (1925). In 1926 he described Lychnocrates to accomodate another fuscous species, leucocapna, and in 1930 he added effluxa to the genus.

Although Meyrick described most of the white species now in Timocratica, he never recognized them as congeneric with isographa since, according to him, they had veins 2 and 3 (CuA_1 and CuA_2) of the fore wings free, not stalked as in the fuscous species [which is not always the case]. As has been pointed out by Busck (1938:283), the venation of the fore wings in this group [Timocratica sensu Busck, i. e. Timocratica + Lychnocrates + the white species] is highly variable, mainly among the white ones; it not only varies between different species but also among specimens of the same species. Some of the white species also have CuA_1 and CuA_2 of the fore wings stalked as in isographa and its related fuscous species.

Busck (1935) was the first to include the fuscous species related to isographa, the white species, and also the fuscous species described in the genus Lychnocrates, in the genus Timocratica. As he later stated (1938), his decision was based on the similarity of the male and female genitalia.

In 1955 Clarke removed Lychnocrates from synonymy with Timocratica, basing his decision on the free CuA_1 and CuA_2 in the fore wings. Even so, Clarke retained effluxa in the genus Timocratica; this species was previously described by Meyrick in Lychnocrates, and undoubtedly belongs to the same group as leucocapna.

During the last ten years the author has bred bark-feeding larvae from several different host-plants in a number of localities and found that the white "bark-feeder" Timocratica albella (autorum) was certainly a species complex. The vexed question of whether these white species, and the species described as Lychnocrates were related to the fuscous taxa (Timocratica) as suggested by Busck was still unresolved and it was clear that a detailed revision of these groups was needed to solve the question and to provide accurate and stable identifications for the bark-feeding species.

The genus Timocratica includes the largest known species of Oecophoridae in the World. The females of some species such as T. leucorectis have a fore wing length of up to 32mm, equivalent to about 80mm wing-span. Judging by the male and female genitalia, the species included in this genus form a very homogeneous group. However, externally they show great variation, mainly in the colour-pattern and the shape and venation of the fore wings. On external features they can be clustered into three very characteristic and well defined groups, except for one species, parvifusca. The group which includes isographa [= monotonia], the type of the genus, is formed by species which have fuscous fore

wings, often with three nearly parallel, oblique fasciae, and which have a crest of long scales on the thorax. The largest group is that of the white species, and includes about three-quarters of the species now in the genus. The third group includes three species, two of them treated previously by Meyrick as a separate genus, Lychnocrates. They have dark fuscous fore wings with, beyond the cell, a diffuse white area crossed by dark fuscous veins; they differ from the first group by the lack of oblique fasciae on the fore wings and lack of the crest of long scales on the thorax. T. parvifusca is an anomalous species which does not fit well in any of these three groups. Judged by its colour-pattern it should be included in the first group, but the shape of its genitalia and the venation of the fore wings place it very close to butyrota, among the white species. The venation of the fore wings is very variable within the white group, but relatively constant in the others. In the white species the venation varies from species with all the veins free, to species with either R_4 and R_5 or CuA_1 and CuA_2 or with both pairs of veins stalked. In the group which includes monotonia, the fore wings of all the species have CuA_1 and CuA_2 stalked and all the other veins free. The species formerly treated as Lychnocrates have the fore wings with all the veins free. In parvifusca R_4 and R_5 and CuA_1 and CuA_2 are stalked.

Although colour-pattern and wing venation define three clearly distinct groups, these features are not sufficient to treat them as separate genera. In the Stenominae wing

venation has little taxonomic value, and the structure of the male genitalia is the main basis for generic division. As the genitalia of the group discussed above are so similar, there is little doubt that they constitute a monophyletic group and they are here regarded as a single — genus.

The species of Timocratica, except for the white ones, show some resemblance externally to the species of Thioscelis and Loxotoma and probably form the sister-group — of the latter. They can easily be distinguished from these genera as Thioscelis has unusually long hind legs and Loxotoma has a conspicuously pink flush on the wings. These two genera also have coremata in pockets on the second abdominal sternites, and the entire valvae have strong, apically bifurcated setae. However, in Loxotoma the gnathos is divided in the middle and each of the digitate processes of the juxta are split into two branches. Thioscelis has an entire gnathos but the valvae have a very well developed ampulla, a character not developed in Timocratica.

Material and methods

About five hundred adult specimens of Timocratica were examined, representing the forty seven species included in this study. Most of these specimens came from the author's collection —about one half— and the BMNH collection —about two hundred; the remaining ones came from the NMNH, Washington, and other institutions indicated in the text. Although the author's collection contained most of the specimens, these represented only one-third of the species, six of them new. In the BMNH collection four-fifths of the species were represented, including seventeen primary types of previously known species and seven of the new species described here. About one hundred specimens have been bred by the author, but these represent only two species, palpalis and melanocosta. The early stages studied included eight larvae and four pupae of each of them, bred by the author.

About three hundred of the specimens studied belong to only four species: argonais, butyrota, melanocosta and palpalis. By contrast, fifteen species are represented only by single specimens; nine of them, including five of the seven described but not named here, only by females. Thus, further collecting is much needed in order to fill these gaps.

The classification and descriptions of the Timocratica species were based on characters of dry, preserved adult specimens. thirty four characters were selected, as

discussed in the section on classification, and used in the cladistic analysis. A selection of these characters were used again in the phenetic analysis as two-state characters.

In the cluster analysis three methods were used to assess the overall similarity or dissimilarity of all species: a) the product-moment correlation coefficient, b) the taxonomic distance coefficient (Sneath & Sokal, 1973:124), and c) Gower's coefficient (Gower, 1971). The data were used either in their untransformed state or after standardized by characters to zero means and unit standard deviations. Clustering of the taxa from the between-taxon similarity/dissimilarity matrix was accomplished by the weighted pair-group method of Sokal & Sneath (1963). All these computations were carried out by a program due to Davis (1973), as amended and extended by Dr R. G. Davies (unpublished). The program also constructed and drew on the line-printer the dendrogram expressing the results of the cluster analysis.

The measurements at the beginning of each description are those of the fore wing length of the smallest and largest specimen, measured in millimeters from the base to the apex of the wing. In several instances the number of available specimens was limited and variation in size of those species may be greater than is indicated by the recorded measurements.

Dissections and slide preparations follow the method described by Robinson (1976). The number of genitalia preparations varied with the relative similarity of species and material available; and is detailed for each species under 'Material examined'. Head preparations were made and illustrated only for representative species of each of the three species-groups. The wing venations is illustrated for representatives of each species-group and for species which differ from the pattern in the group. Drawings of the genitalia are based on individual specimens and are not composite. The size of the illustrations depended on the size of the specimens. Large specimens were drawn to a smaller scale and in some instances figures of different scale appear on the same page. The photographs of the moths show the right-hand wings; where these were unsuitable for photography the left-hand wings were taken and the image reversed. All the drawings and half-tone illustrations except one were made by the author. —

The geographical distribution of each species is based on specimen labels and completed and/or corrected, when necessary, according to the 1968 edition of the Times Atlas of the World. Localities not traced in this atlas were corrected and completed following Brown (1979). Altitude, when given in feet on the specimen label was converted into meters, for example: '1000m ('3,100 feet')'.

The ecological distribution of the species of Timocratica is expressed according to Holdridge's system of 'Classification of World Life Zones' (Holdridge, 1967; 1978; Holdridge et al., 1971). This system has the advantages of being simple and easily used by any biologist, not only by ecologists, and of being objective, since it is based mainly upon meteorological data, viz., annual average temperature and total annual precipitation. Another advantage is that most of the Central and South American countries have already been mapped following this system.

Data on temperature and precipitation were taken from Wernsted (1972). However, as there are no meteorological station at the locality of many of the species, the data used were those provided by the nearest station at the same altitude. In a few cases, no nearby meteorological station at a similar altitude was found in Wernsted, and the nearest station was selected and the temperature corrected assuming a decrease of about 6 °C per each 1000m of elevation (Holdridge, 1971:13). Following these procedures a list of all the localities taken from specimen-labels was organized, including geographic coordinates, altitude, mean annual temperature, total annual precipitation and the respective Life zone. This list was submitted to Dr Holdridge who checked it and made corrections and comments.

It must be remembered that in many cases, chiefly those of specimens from old collections, localities and other data given on labels are vague and sometimes wrong. Therefore, particularly in mountainous areas where the climate changes over relatively short distances, many of the specimens could have been collected in Life Zones different from those calculated from the available label data. Another problem resulting from lack of data and particularly of specimens is that some of the specimens were probably collected in associations which are not typical of the Life Zone ('Climatic Association' of Holdridge, 1971:16). A good example of non-climatic association and of specimens presumably mislabelled is that of T. major.

Despite the problems pointed out in the last paragraph, Holdridge's Life Zone system provides valuable information about the ecological adaptations of the species and also gives a good indication of where a species could be expected to occur.

The host plants collected by the author were identified by Dra M. Brandão Ferreira, Empresa de Pesquisa Agropecuária de Minas Gerais, Belo Horizonte, and are marked in the Table with an asterisk (*). Other hosts are quoted from Araujo et al. 1968:290) and from Hayward (1969:72). Brazilian vernacular names for the Myrtaceae are taken from Legrand & Klein (1967-1978). English vernacular names are quoted from Bailey (1900-1902) and Adams (1972). The ichneumonid parasite of palpalis was identified by Dr M. G. Fitton, BMNH.

The following abbreviations are used in this work:

BMNH	British Museum (Natural History), London, England.
ESALQ	Escola Superior de Agricultura "Luiz de Queiroz", Piracicaba, São Paulo, Brazil.
IP	Institut für Pflanzenschutzforschung, Eberswalde, East Germany.
LN	Landessammlungen für Naturkunde, Karlsruhe, West Germany.
MNHU	Museum für Naturkunde der Humboldt-Universität, Berlin, East Germany.
MNRJ	Museu Nacional, Rio de Janeiro, Brazil.
NM	Naturhistorisches Museum, Vienna, Austria.
NMNH	National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.
UCV	Universidad Central de Venezuela, Maracay, Venezuela.
ZSBS	Zoologische Sammlung des Bayerischen Staates, Munich, West Germany.

Colour-pattern and defence

The species of the genus Timocratica show two basic colour-pattern. Those belonging to the monotonia and leucocapna species-groups, as well as parvifusca, which belongs to the albella-group, have dull fuscous fore wings and bright golden-ochreous hind wings and abdomen. The species of the albella-group, except for parvifusca, have white fore wings and white or golden-yellow hind wings and abdomen.

Concerning protection against predation, the first group — is probably cryptic, or possibly cryptic only when at rest as the raised golden-ochreous hind wings are possibly aposematic. The second group, the whites, are probably aposematic. Field tests carried out by Collins and Watson (1981), in Venezuela, have shown that white species of lithosiids (Arctiidae) were rejected by birds. These mostly white lithosiids form a very large and common group, now included in the genus Agylla, and are sympatric with the species of Timocratica. Adults of many species of arctiids are known to be toxic (Rothschild, et al., 1979). If the species of Timocratica prove not to be toxic, they would form a Batesian mimetic group of the species of Agylla.

This complex of white mimics may also include species of other moths, such the species of Rupela (Schoenobiinae), a large genus of neotropical pyralids.

The cryptic group of Timocratica includes twelve species, the supposed mimic thirty-four species. Thus, if other factors that might affect the success of a group of living organisms are excluded, it seems that a mimetic habit provides more effective protection than crypsis in Timocratica.

Geographical and ecological distribution

The genus Timocratica is confined to the Neotropical Region, ranging from the Gulf of Mexico in the North, to the Northern part of Argentina in the South. In South America it is almost restricted to the Eastern side of the Andes, with most of the species represented in the Amazonian Basin.

Despite its wide geographical distribution, the genus is confined ecologically to a few Life Zones, chiefly to three: Tropical Moist Forest, Tropical Premontane Moist Forest, and Tropical Premontane Wet Forest (Fig. 1).

The monotonia-group, despite its relatively small number of species, has the widest geographical and ecological distribution. It ranges from Mexico and Central America, where it is represented by two species, possibly three, to the warm Temperate Moist Forest in the Southern part of Brazil, where it is represented by meridionalis, having also one species, longicilia, occurring in the Tropical Montane Rain Forest, in the mountains of Colombia.

The leucocapna-group appears to be a mountain group, as it has been collected only in the mountains of Peru, Colombia and Costa Rica, restricted to the Tropical Premontane Moist Forest and the Tropical Premontane Wet Forest Life Zones.

The albella-group, the largest of the species-groups, is mainly South American and only two species, xanthotarsa and parvifusca, are known to occur in Panama and Costa Rica, in Central America. Ecologically the group is almost confined to the Tropical Moist Forest and the Tropical Premontane Moist Forest and Wet Forest, but is represented by three species in the Warm Temperate and Subtropical Moist Forest, and by one, guarani, in the Warm Temperate Dry Forest.

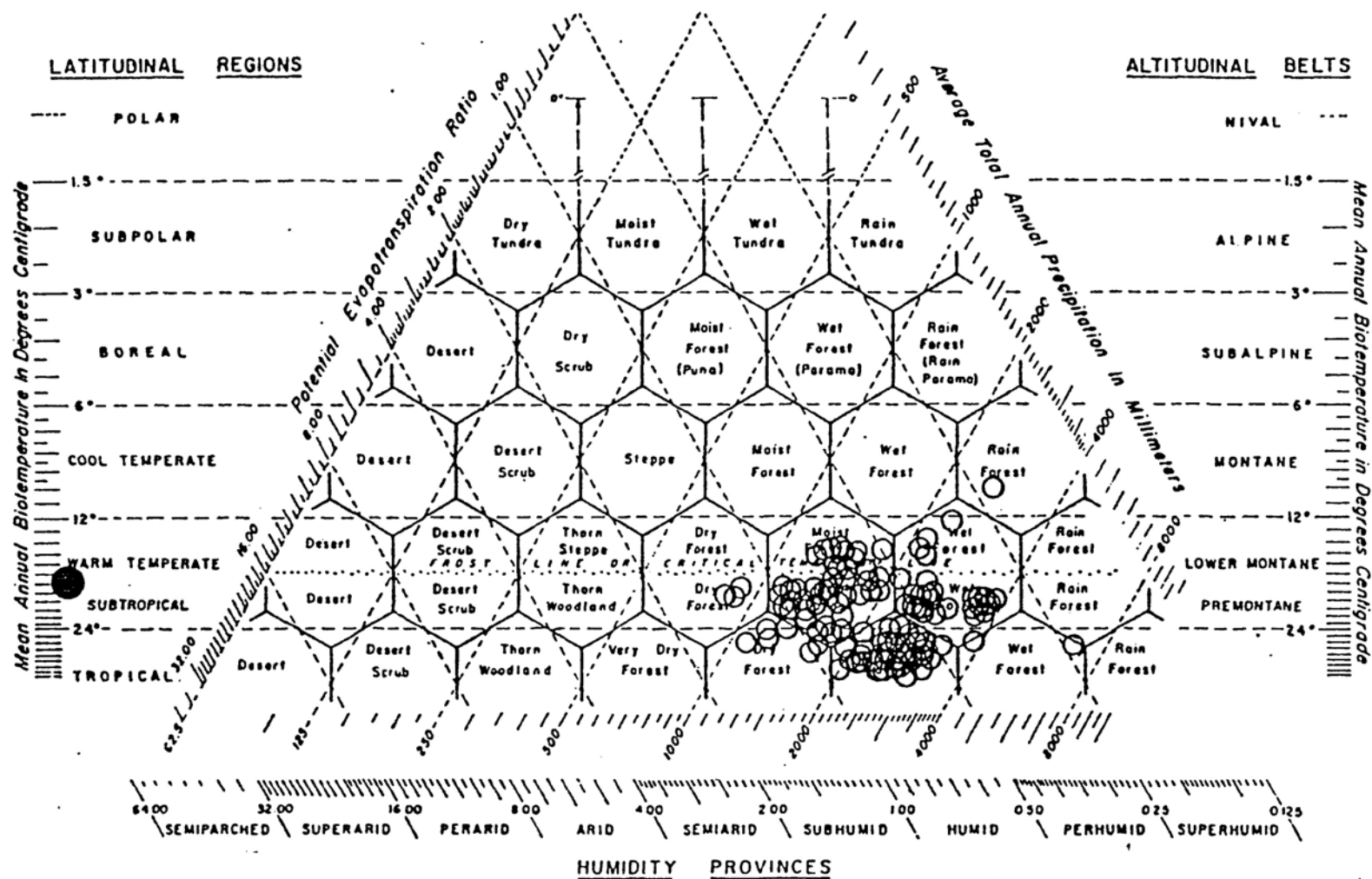


Fig. 1 Diagram of Holdridge's classification of World Life Zones, with the ecological distribution of Timocratica. The filled circle on the left represents the collecting place, Callao, Peru, of the specimens of major, which are presumably mislabeled.

Classification of Timocratica

Like many other Lepidopteran groups of the Neotropical Region, particularly the microlepidoptera, the Stenominae have been very little studied or even collected. Therefore it is very difficult to appreciate the degree of variation in the group, or the relationship between the different groups in the subfamily.

An attempt was made to work out the phylletic relationship of the species based on a cladistic analysis of the genus. However, as is discussed below, many difficulties were found and only a basic division of the genus into three species-group, as arranged in the cladogram (Fig. 3), seems to be sound. Because of this, the species of each of the three species-groups are arranged phenetically, following numerical methods. The thirty four characters used in the classification are resumed in the character matrix presented in the Fig. 2.

Cladistic considerations and character analysis

Although the species now included in the genus Timocratica show great external differences between species-groups, mainly in colour-pattern, they apparently constitute a monophyletic group. According to the characters discussed below, the genus is composed of three species-groups, each of them also apparently monophyletic.

This basic division of the genus into three species-groups seems consistent and presumably reflects very well the first

		<u>monotonia-</u> group										<u>leucocapna-</u> group										<u>albella-</u> group									

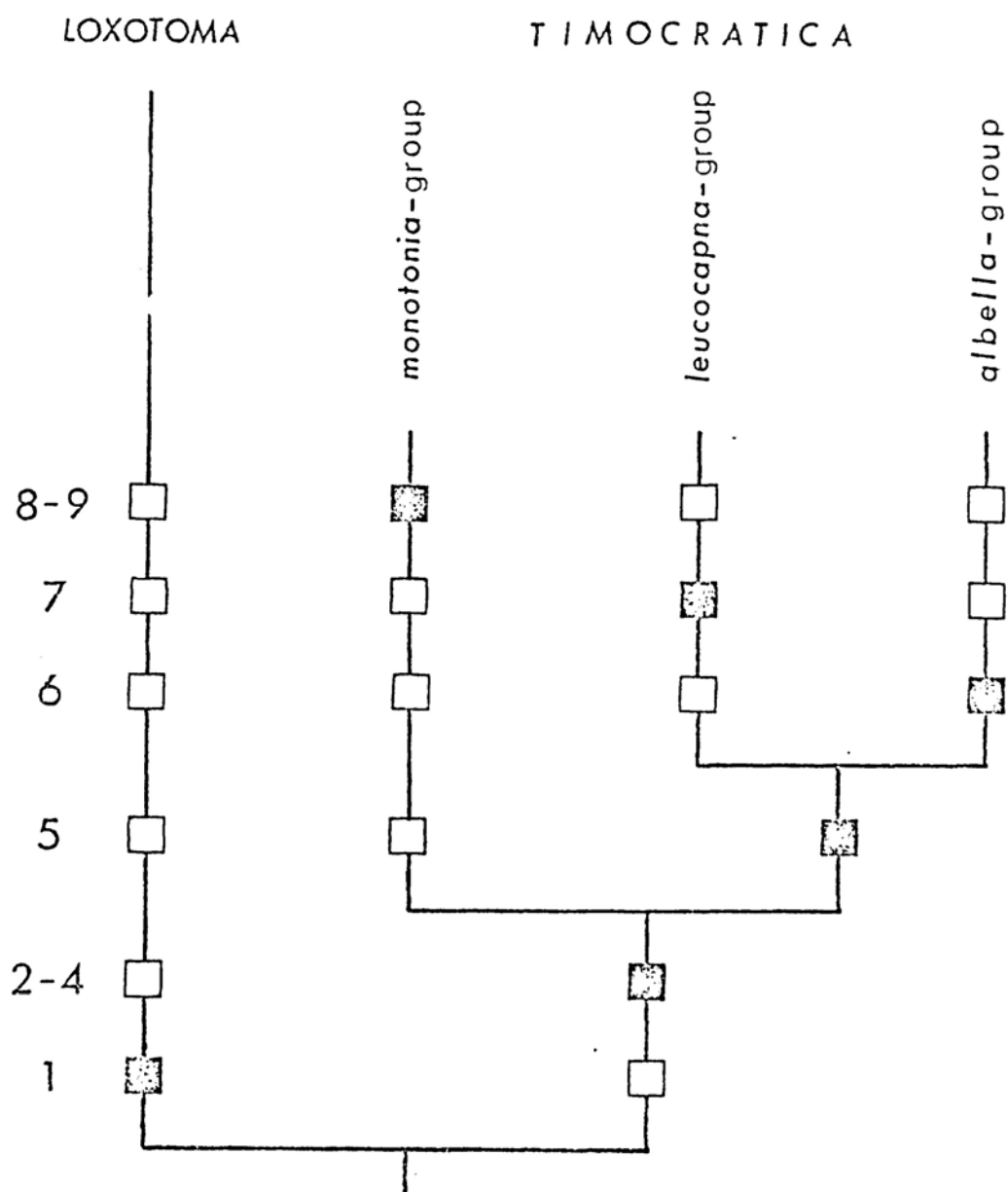


Fig. 3 Cladogram representing the relationship between Timocratica and Loxotoma, and the primary division of Timocratica into species-groups. Open squares represent plesiomorphy, filled represent apomorphy. Numbers denote characters discussed in the text.

steps of its evolution. However, above this level it was impossible to understand the relationship between the species within each of the three groups. The main difficulty is the lack of data. Obviously many of the apomorphies are not expressed morphologically, but reflected in behavior, host-preferences, ecological adaptations, and other biological and physiological features. As the biology of Timocratica is insufficiently known, none of this information can be included in the analysis. Another difficulty is related to the method itself, as it has been conceived by Hennig (1966). It seems that cladistic analysis may work very well at generic level and for higher classification, but not at specific level, except perhaps with relatively small and well known groups. At the specific level it is often very difficult to decide whether a particular state of a character is primitive (plesiomorphic) or derivative (apomorphic).

Although most of the important genera of the subfamily are still poorly known, it seems very likely that the sister-group of Timocratica is the genus Loxotoma Zeller, which includes only two described species. They have similarly broad valvae, with sacculus and ampulla not differentiated, and a strong uncus that is basally broad and bent ventrad. Loxotoma also constitutes a monophyletic group, whose species share at least the apomorphic state of character 1. The monophyly of Timocratica is defined by characters 2-4 (Fig. 3). The following list headings denote apomorphic state.

(1) Basal third of the fore wing costa concave

In most Stenominae, including Timocratica, the fore wings have a straight to convex costa. In Loxotoma the costa is concave, as are the subcostal and first radial veins to some extent (see figure in Duckworth, 1967:7).

(2) Gnathos not divided at middle

Timocratica has an undivided gnathos expanded medially to form a strongly sclerotized projection which is bent ventrad, the 'apex'. In Loxotoma as well as in other presumably related groups, such as Falculina, the gnathos is divided in the middle, often forming a pair of apically dentate arms.

(3) Juxta with two simple, almost straight, lateral processes

In Timocratica the two lateral processes of the juxta are simple and almost straight, whereas in Loxotoma each process is divided in two, as it is in Falculina where these processes are developed to very complex structures.

(4) Vesica armed with cornuti

In Timocratica the vesica is armed with a strong cornutus or covered with many spines, or with both. These features are not developed in Loxotoma or other related genera such as Falculina.

Division of the genus Timocratica into species-groups

Except for parvifusca, a small species of uncertain position, all species can easily be clustered into three well-defined natural groups: 1, the albella-group which includes species with white fore wings; 2, the monotonia-group whose species have fuscous fore wings with three oblique, nearly parallel fasciae; 3, the leucocapna-group which includes species with dark fuscous fore wings, without fasciae, but with a diffuse white area beyond the cell and an area of yellow scales on the basal half of the costa. T. parvifusca (Fig. 135) is a small, dark fuscous species, in which the fore wings have R_4 and R_5 and CuA_1 and CuA_2 stalked, and M_1 missing (Fig. 62). The shape of its wings, genitalia, wing-venation, as well as its distribution put it very close to butyrota, a small white species in the albella-group. The fuscous colour of parvifusca is presumably due to a secondary loss of the advanced state.

These three species-groups are defined by characters 5-9 (Fig. 2), discussed as follows. Character 5 is the apomorphy of the clade comprising the albella-group + leucocapna-group, 6 is the apomorphy of the albella-group, 7 of the leucocapna-group, and 8-9 the apomorphies which define the monotonia-group (see cladogram in the Fig. 3).

(5) Fore wings with white scales

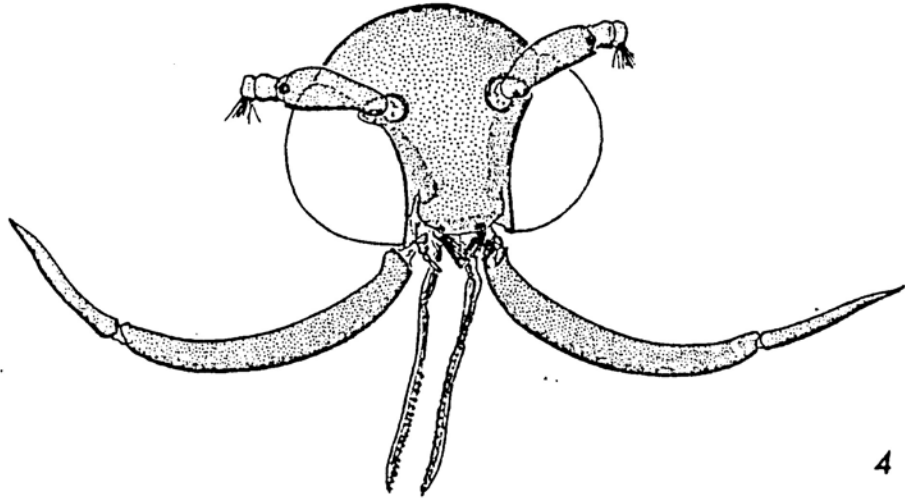
The species of the monotonia-group have the ground-colour of the fore wings plain fuscous, a state which is also found in their sister-genus Loxotoma. The species of the albella-group have a plain white ground-colour, and in the leucocapna-group the ground-colour is fuscous but the fore wings also have areas with white scales on the upper surface, mainly beyond the cell. The presence of such white scales in the leucocapna-group and the white fore wings in the albella-group could therefore be considered an apomorphic transformation series. This makes these two species-groups the sister-clade of the monotonia-group.

(6) Digitate processes of juxta long

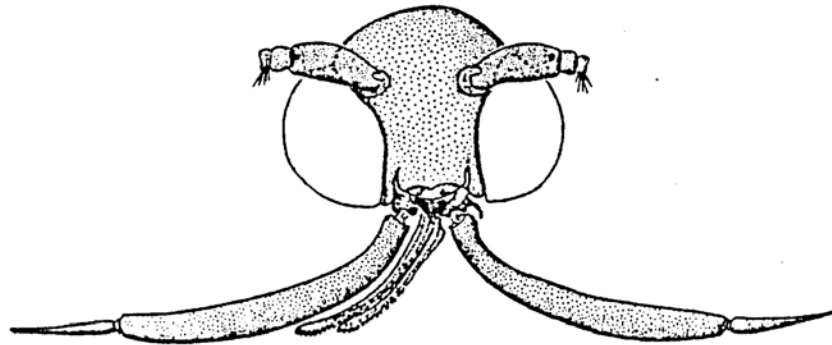
The monotonia and leucocapna groups have the digitate processes of the juxta short, not reaching the anterior side of the gnathos (except in major where they are long, as in the albella-group). In the albella-group these processes are often very long, overlapping the anterior side of the gnathos. The short state of this character is here considered plesiomorphic as the homologous hairy processes are also short in the sister-genus Loxotoma and Falculina.

(7) Third segment of labial palpi small

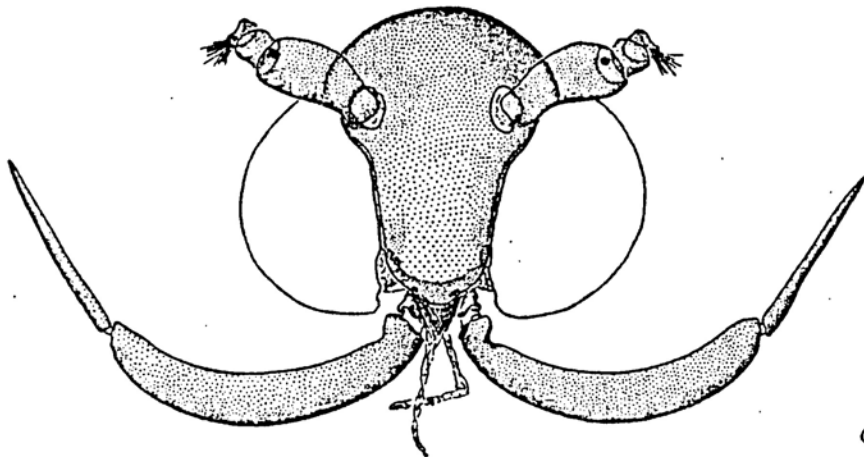
The species of the leucocapna-group have the third segment of labial palpi much reduced (Fig. 5), less than one third the length of the second, whereas in the other species-groups, as well as in Loxotoma it is longer, about



4



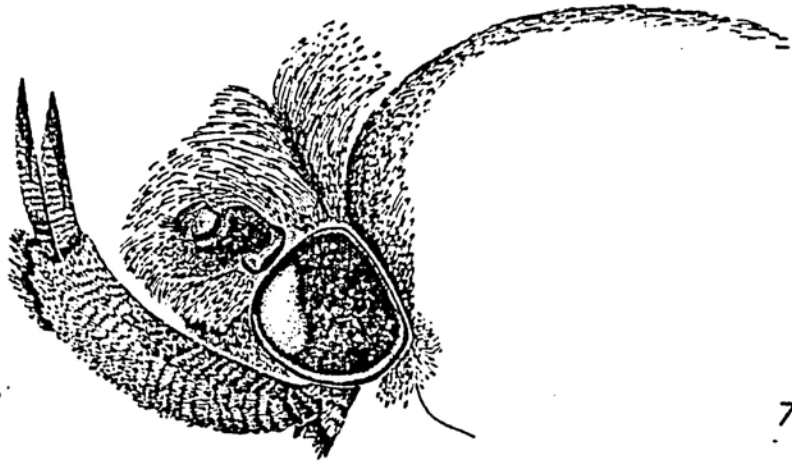
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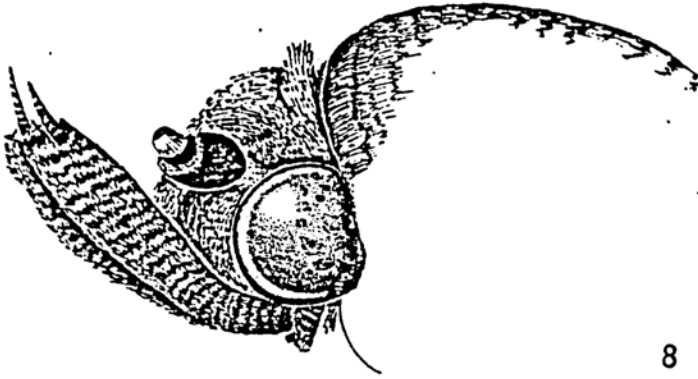
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V. H. 21

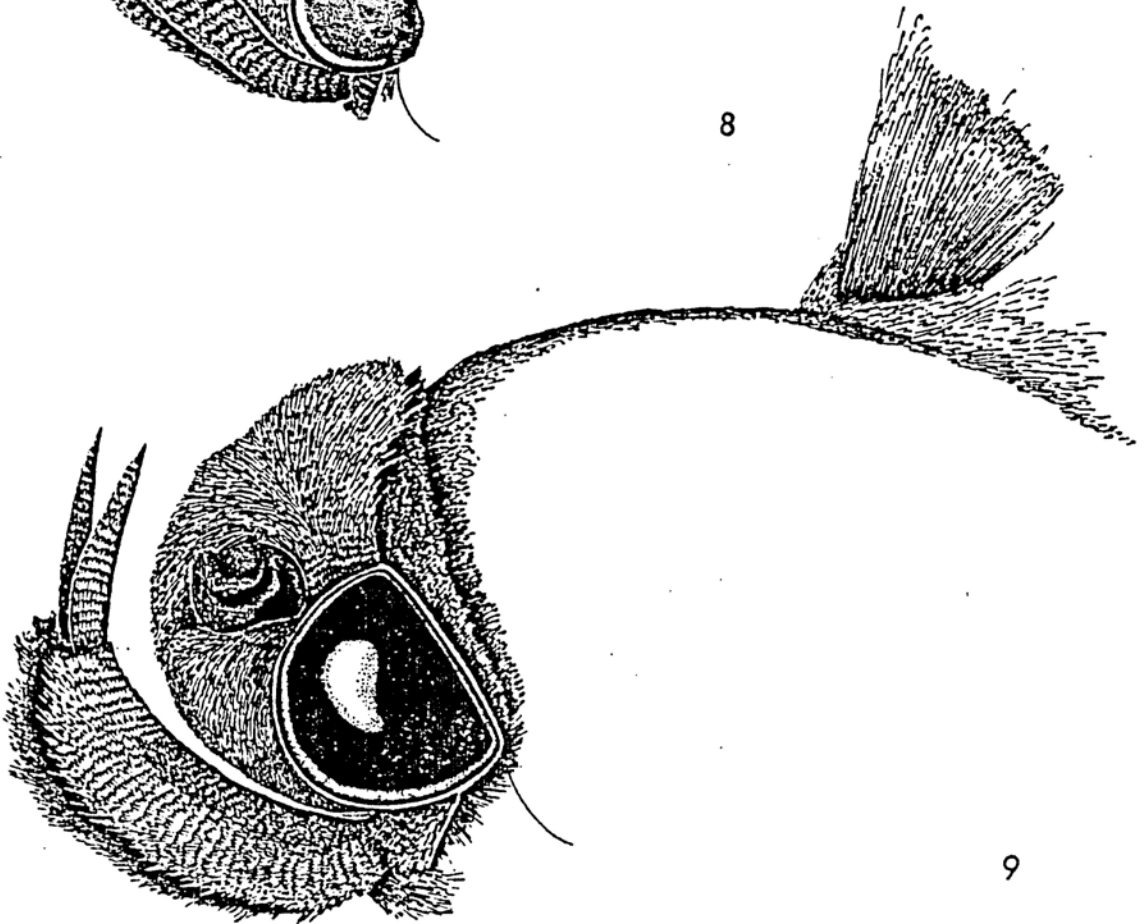
Figs 4-6 Frontal view of denuded heads of Timocratica.
4, T. palpalis (Zeller). 5, T. leucocapna
(Meyrick). 6, T. monotonia (Strand).



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8



9

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Figs 7-9 Lateral view of Timocratica heads and dorsal outline of thorax. 7, T. palpalis (Zeller). 8, T. leucocapna (Meyrick). 9, T. monotonia (Strand).

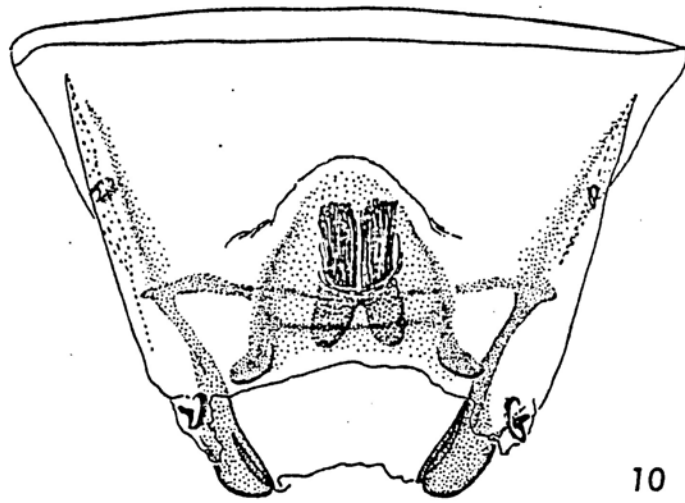
two-thirds the length of the second (Figs 4, 6, 7, 9).

(8) Mesonotum with long scales

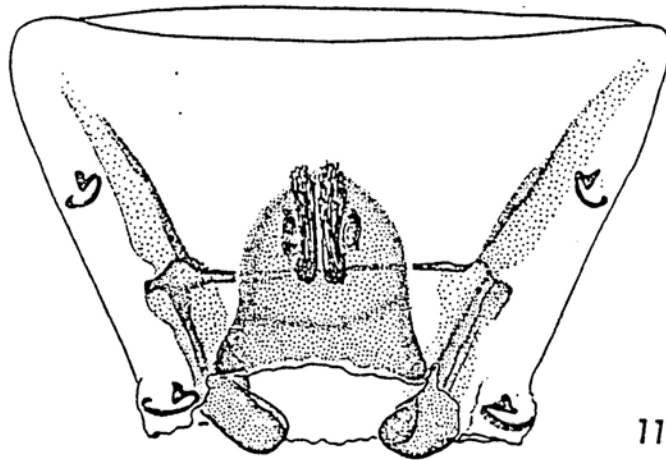
In the monotonia-group the scales along the middle of the mesonotum are very long and raised to form a crest (Fig. 9); in the remaining groups these scales are normal as in Loxotoma and Falculina. Therefore, this development is an autapomorphic state for the monotonia-group

(9) Fore wings with cubital veins stalked

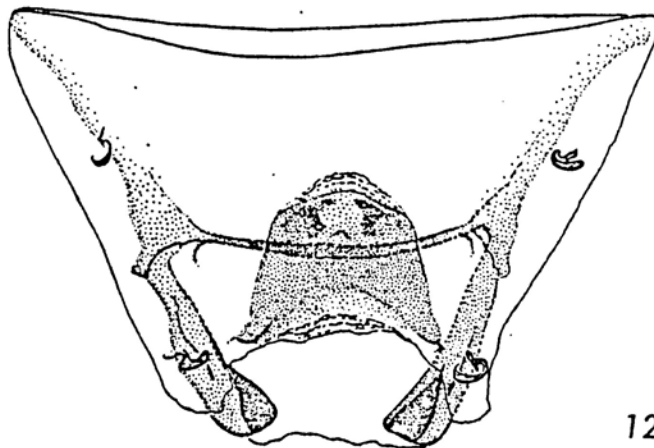
The species of the monotonia-group have the fore wings with CuA_1 and CuA_2 stalked (Fig. 16); in the leucocapna-group all the veins are free (Fig. 45); and in the albella-group the veins are free in most species but in some the cubitals are stalked (Figs 53-62). However, the stalking in these few species seems to be linked to the stalking of veins R_4 and R_5 , a character not found in the other two species-groups. Considering that Loxotoma also has all the veins free, the stalking of the cubital veins in the monotonia-group can be considered apomorphic.



10



11



12

V. 81

Figs 10-12 Abdominal segments 1-2 of Timocratiça ♂.
 10, T. monotonia (Strand). 11, T.
meridionalis sp. n. 12, T. loxotoma (Strand)

The monotonia species-group

The species included in the monotonia-group, except for major, form a very compact and homogeneous group, some of the species being very difficult to distinguish from others. All except monotonia are defined by at least one apomorphy, but it was impossible to arrange them in a strictly dichotomous way because none of the apomorphies are shared by any of the species, except for meridionalis+loxotoma+fraternella and possibly species 1, which share apomorphy 12.

(10) Fore wing with the apex pointed

T. major has the apex of the fore wings pointed (Fig. 15) and regarded as autapomorphic, since all other species in the genus have it rounded, as well as the species belonging to the sister-genus Loxotoma.

(11) Fore wings with fasciae linked posteriorly

The species of the monotonia-group have the three fasciae of the fore wings not touching each other, except for agramma which has no fasciae at all. T. major has the fasciae connected posteriorly to a fourth fascia which follows the fold of the wing, more or less parallel to the internal margin and tornus (Fig. 17).

(12) Coremata of the second abdominal sternite free or absent

The known males of the species in the genus have a pair of coremata bound in pockets on the second sternite (Fig. 10). In meridionalis these coremata are also present but not

bound in pockets, being freely attached on the sternite surface. In loxotoma and fraternella the coremata are missing. Therefore, the pair loxotoma+fraternella and possibly species 1, form the sister group of meridionalis which preserves the intermediate state between the two and the remaining species in the genus. As the genus Loxotoma also has a pair of coremata bound in pockets, this feature can be regarded an apomorphic transformation series.

(13) Hind wings fuscous

T. fraternella has the hind wings dark fuscous, and T. species 1 has them yellowish fuscous, whereas all other species of the group have these wings golden-yellow, a state also found in the leucocapna-group and some of the species of the albella-group. T. fraternella and T. species 1 are known from one sex, fraternella from males and species 1 from females. Therefore, as they are sympatric, they could represent the opposite sexes of the same species. If they do, they possibly form the sister-species of loxotoma, the only other species of the group known to occur together in Central America.

(14) Apex of gnathos folded

In all the species of the genus the medial part of the gnathos is strongly sclerotized, forming a strong, pointed or rounded projection, the 'apex'. In longicilia the gnathos is folded medially, looking like a folded belt (Fig.24).

(15) Fore wings with transverse fasciae absent

The species which belong to the monotonia-group have the fore wings crossed with three oblique, nearly parallel fasciae, a character also present in Loxotoma and in other species in the subfamily. In agramma these fasciae are absent (Fig.18).

(16) Valvae with base broader than distal part

T. monotonia and pompeiana are close related species, being extremely similar and quite impossible to distinguish externally from each other. The only relevant difference between the two is the width of the valvae. In almost all the species of the genus the lateral margins are nearly parallel but in pompeiana the margins converge towards the apex, the base being twice the width of the apical part (Fig.25).

The leucocapna species-group

The leucocapna-group includes leucocapna and effluxa, two species described by Meyrick in his genus Lychnocrates, and possibly a third species, T. species 2, represented by a single male in the BMNH, maintained unnamed because its recognition as a good species depends on discovering more material. Only one apomorphy, as discussed below, was found and it separates effluxa from leucocapna+species 2.

(17) Hind wings bordered with fuscous

The plesiomorphic state of the hind wing colour is golden-ochreous, as present in the monotonia-group as well as in some species of the albella-group. T. leucocapna and species 2 have the hind wings in this state, whereas in effluxa the margins are fuscous and are thus considered apomorphic.

The albella species-group

There is little doubt that the species included in the albella-group are also monophyletic. However it was impossible to work out a sound cladistic arrangement between all of them because most of the outstanding characters seem to have developed independently in different, apparently not related species, as can be seen in the character matrix (Fig. 2) and from the discussion of the characters below.

(18) Hind wings white or tinged with yellow

The species belonging to the albella-group present the hind wings in three kinds of colour-pattern. Some have them plain golden-yellow to golden-ochreous, others have them partially tinged with yellow above or below, mainly along the costa and termen, and the third group have them plain white. The first condition can be considered plesiomorphic since it also occurs in the species of the leucocapna and the monotonia species groups. Therefore the reduction or absence of yellow can be regarded as an apomorphic transformation series. Five species, here designated the

grandis-complex, retain the plesiomorphic state: grandis, bicornuta, xanthotarsa, constrictivalva and species 3, while all the others have the hind wings with yellow reduced or absent. Although the overall similarity suggests — that the grandis-complex is monophyletic, and thus would be the sister-group of all others, no apomorphy has been detected to prove its monophyly. .

(19) Abdomen above white or tinged with yellow

Similarly to what occurs with the hind wing colour, the character discussed above, the abdominal colours of the albella-group are expressed in three ways: 1, plain ochreous above; 2, tinged with yellow above; 3, plain white. In the monotonia and leucocapna species-groups the abdomen is plain ochreous. Therefore the reduction or absence of yellow can be regarded an apomorphic transformation series. All the species belonging to the grandis-complex and the following six, here called the xanthosoma-complex, have the abdomen in the plesiomorphic state: xanthosoma, amseli, subovalis, fuscipalpalis, venifurcata and species 4. The remaining ones, here called the albella-complex, have the abdomen in the apomorphic state with yellow reduced or absent.

According to both characters discussed before, 18 and 19, there are two possible ways to divide the albella-group: 1, include in one group all the species which have the hind wings with yellow reduced or absent (character 18), i. e., the xanthosoma-complex + albella-complex, and keep apart the others, i. e. the grandis-complex; 2, include in one

group all the species which have the abdomen with yellow reduced or absent (character 19), i. e. the albella-complex, and retain apart the others which have the abdomen plain-ochreous, i. e. the grandis-complex + xanthosoma-complex. The fact that no species which has the abdomen with yellow reduced or absent, the apomorphic state, and with the hind wings plain-ochreous, the plesiomorphic state, has been found indicates that divergence in wing colour started earlier than divergence in abdomen colour. Therefore possibility 1 is the most plausible.

(20) Fore wings below with yellow colour absent

The species belonging to the monotonia and leucocapna species-groups, as well as most species in the albella-group, have the fore wings golden-ochreous or golden-yellow below. The species belonging to the xanthosoma-complex, except for subovalis and species 4, and the following ones, which belong to the albella-complex, have the fore wings white below: anelaea, albitogata, isarga, melanocosta and nivea. The four species belonging to the xanthosoma-complex and the last four of the albella-complex could form two monophyletic groups, but anelaea, which has the abdomen ochreous crossed with white bands, is probably not related to any of them.

(21) Hind tarsi white

The species included in the monotonia and leucocapna species-groups have the legs golden-ochreous. This colour is retained in the tarsi of many of the species in the

albella-group, while others have them white. Therefore the first state can be regarded as plesiomorphic, and the absence of yellow apomorphic. All the species of the xanthosoma-complex, and anelaea, isarga, albella, guarani, melanocosta, nivea, melanostriga, philomela, butyrota and parvileuca have the hind tarsi white. Some of these species could be related to some of the others, such as the four which belong to the xanthosoma-complex discussed above (character 20), but others like anelaea and melanostriga are not, because their relationship is not confirmed by other apomorphies (see character matrix).

(22) Fore tarsi covered with white scales above

Eleven species belonging to the albella-group have the fore tarsi covered with white scales above. Four of these belong to the xanthosoma-complex: xanthosoma, fuscipalpalis, venifurcata and species 4; seven belong to the albella-complex: titanoleuca, macroleuca, albitogata, albella, guarani, melanocosta and nivea. The first three species of the xanthosoma-complex probably form a monophyletic group, but the fourth, species 4, is probably more closely related to subovalis than to those three, since both have the fore wings tinged with yellow below. T. titanoleuca and macroleuca probably form a pair of sister-species, but it is unlikely that both are related to any of the remaining five species in the complex. According to their overall similarity they seem to be related to leucorectis. The other five: albitogata, albella, guarani, melanocosta and nivea, could be closely related but their monophyly is not confirmed by characters 20-21.

(23) Fore tarsi golden-ochreous

All the species in the genus have the fore tarsi fuscous; even those of the albella-group, which have them white above, also have them fuscous below. Three species, which belong to the grandis-complex, have them golden-ochreous: xanthotarsa, constrictivalva and species 3.

The characters above (22 and 23) do not appear to be correlated, the latter is the result of loss of the fuscous scales which are replaced by the ochreous ones which cover the whole leg, while in the first the fuscous scales still remain below, only the dorsal side being replaced by white ones.

(24) Frons plain white

Most of the species of the albella-group have the frons edged with fuscous or ochreous, as the species belonging to the monotonia and leucocapna species-groups. In some species of the albella-group (both males and females) it is plain white, while in others this is only true of the females. As males of eight species are still unknown and, as all species which have males with frons plain white have also females with this character state, only males are taken into consideration. The following species have males with plain white frons: the species of the xanthosoma-complex except for subovalis (the male of species 4 is unknown), and albitogata, nivea and melanocosta which belong to the albella-complex. The females of isarga, albella and melanostriga also present this state but their males are unknown. The females of megaleuca and species 5-7 have their frons edged with fuscous, the males are presumably the same.

(25) Labial palpi with ochreous colour absent

In both the monotonia and leucocapna species groups the second segment of the labial palpi is ochreous and fuscous. In many of the species in the albella-group this state is retained, but in others the ochreous colour is missing and so considered apomorphic. The species of the xanthosoma-complex except for amseli, subovalis and species 4, and the following five, which belong to the albella-complex, have the labial palpi with ochreous colour missing: titanoleuca, nivea, butyrota, parvileuca and parvifusca. Except for species 4, three species of the xanthosoma-complex could be monophyletic: xanthosoma, venifurcata and fuscipalpalis. T. butyrota, parvileuca and parvifusca could constitute a monophyletic group, but titanoleuca and nivea certainly are not related to each other either with any of the others discussed above.

(26) Labial palpi with fuscous colour missing

As has been discussed above (character 25) the ground-plan for the colour of the labial palpi in the albella-group seems to be a combination of white, ochreous and fuscous. Two species of this group have the second segment of the labial palpi with the fuscous colour missing: melanocosta and melanostriga. As can be seen in the character matrix these two species are presumably not related, and this character is also not linked to any of the previous ones.

(27) Gnathos with lateral arms modified

Most of the species in the genus have the arms of the gnathos simple. Three species which belong to the albella-group have the lateral arms bearing modifications in the middle, forming ventrad or posteriorly-directed projections (Figs 91-94). Two species, leucorectis and spinignatha, could form a pair of sister-species, but the other, costrictivalva, has nothing to do with them, since it has the hind wings and abdomen in the plesiomorphic state. Of course only the species in which males are known have been considered here.

(28) Vesica with small spines missing

In most of the species in this genus the vesica is armed with a large, strong cornutus and several smaller spines (see character 4). Three species of the albella-group have the vesica with the smaller spines missing: bicornuta, butyrota and parvifusca. T. bicornuta, which belongs to the grandis-complex, has two strong cornuti on the vesica (Fig. 66), a unique case in the genus. T. butyrota and parvifusca are probably related species, although concerning colour-pattern parvifusca is very different. However, their relationship is strongly supported by size, wing shape, wing venation, genitalia and distribution.

(29) Fore wing with R_4 and R_5 stalked

Most of the species of the albella-group have the fore wings with all veins free, a state also found in the sister-group leucocapna and in the genus Loxotoma. Four

species belonging to the albella-group have the fore wings with R_4 and R_5 , and CuA_1 and CuA_2 stalked: venifurcata, nivea, butyrota and parvifusca. Two species have only the cubitals stalked: isarga and species 3. T. butyrota and parvifusca are probably related, the others seem not to be so. T. venifurcata belongs to the xanthosoma-complex, and nivea, according to the characters 20-22 and 24, probably is the sister-species of melanocosta. T. isarga belongs to the albella-complex and T. species 3 to the grandis-complex, but as they are represented only by a single female each their relationships are difficult to understand.

(30) Fore wings with base of costa tinged with grey

The species of the albella-group have the fore wings with the costa white or tinged with yellow. Two species, xanthosoma, which belongs to the xanthosoma-complex, and melanocosta which belongs to the albella-complex have the base of the costa tinged with dark grey or black.

(31) Veins marked with dark fuscous

One species, melanostriga, has the wings white with veins marked with dark fuscous, a unique case in the genus (Fig. 89). Only a female of the species is known, but according to its genitalia and overall similarity there is little doubt that it belongs to the albella-complex.

(32) Ductus and corpus bursae not differentiated

All known females in the genus, except butyrota, have the ductus bursae relatively narrow and differentiated from the

corpus bursae. T. butyrota has the bursa in the shape of a long and wide bag (Fig.131). This is an autapomorphy for the species.

The following two characters were useful to differentiate some of the species, but as the two states found occur in all three species-groups, it has been impossible to establish which state is primitive and which is derivative. It is quite possible that they have no value at all regarding those conditions.

(33) Gnathos with pointed apex

The species of the monotonia-group have the apex of the blunt, except for agramma, in which it is pointed, as well as in all species of the leucocapna-group. In the albella-group about one-half of the known species have it pointed (see character matrix, Fig. 2).

(34) Margin of ostium bursae convex

The margin of the ostium bursae varies from slightly concave or straight to strongly convex, having in some species a well developed, posteriorly directed projection. This variation occurs in the different species throughout the three species-groups.

Phenetic analysis

A satisfactory arrangement based on a cladistic analysis of the species groups, mainly those of the albella-group, could not be produced. This failure was due mainly to the mosaic pattern of evolution shown by the species. An assessment of phenetic similarity was therefore made, following numerical methods, as shown in Figs 13-14.

The arrangements given by the three phenetic methods showed few differences from one other, and in a few cases they were even identical. However, the most generally satisfactory results were provided by Gower's Coefficient. —

The clustering of the monotonia-group (Fig.13) was based on characters 6, and 10 to 16. The basic division of this group into three subgroups, as shown in the phenogram, reflects very well what was expected from the overall similarity of the species. T. major is really a very distinctive species in the group, and its separation from the others seems plausible. The division of the other species into two groups, as shown in the same phenogram, also seems correct, although the arrangement of the species inside each of these subgroups does not reflect very well what might have been expected from their overall resemblance. — As discussed in the taxonomic section, monotonia and pompeiana would have been expected to form a pair of very closely related species, or even to appear as forms of the same species. In the other subgroup, for the same reasons, fraternella and loxotoma should form a pair of closely related species, as indicated by the absence of coremata on

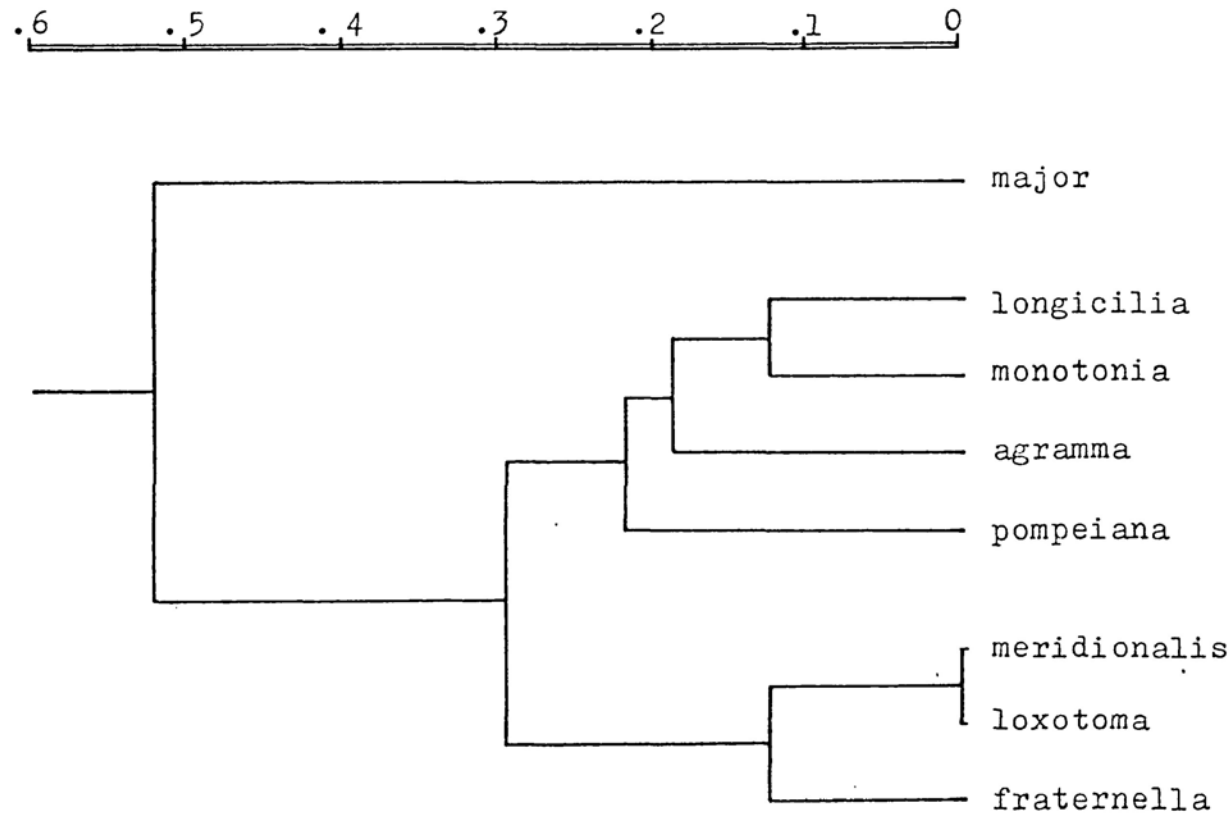


Fig. 13 Phenogram of the species of the monotonia-group of Timocratica calculated by weighted pair-group method of average linkage from matrix of between OTU Gower's coefficients using not standardized data. Number at top denote magnitude of correlation coefficient.

their male abdomen and by their geographic distribution. The way that meridionalis and loxotoma came together in the phenogram is because the free coremata (character 12), as present in meridionalis, and the absence of coremata, as shown in loxotoma and fraternella, were both considered as apomorphic, while the presence of coremata bound into pockets, as shown by the other species of the group, is considered plesiomorphic. As meridionalis and loxotoma are almost identical in respect of the remaining characters, they were therefore clustered together, while fraternella which shares the absence of coremata with loxotoma, was separated from both by the apomorphic fuscous hind wings.

The arrangement of the species of the albella-group was based on the similarity of characters 5, 9 and 19-34. The resulting grouping (Fig. 14) also looks reasonable, except that the species with a golden-ochreous abdomen, forming the xanthosoma-complex, were mixed up with those which have white abdomen, the albella-complex. If this character, the colour of the abdomen in the albella-group, is considered as more important than most of the others analysed, then amseli, subovalis, venifurcata, xanthosoma and fuscipalpalis should form a group of closely related species. A few other species, viz., anelaea+isarga and titanoleuca+parvileuca, also seem to be wrongly associated. As discussed in the taxonomic section, isarga appears to be related to palpalis and parvileuca to butyrota. These apparent inaccuracies in the phenetic cluster analysis probably resulted from the lack of representation of males or females in about two-thirds of the species, and from the equal weight given to all characters.

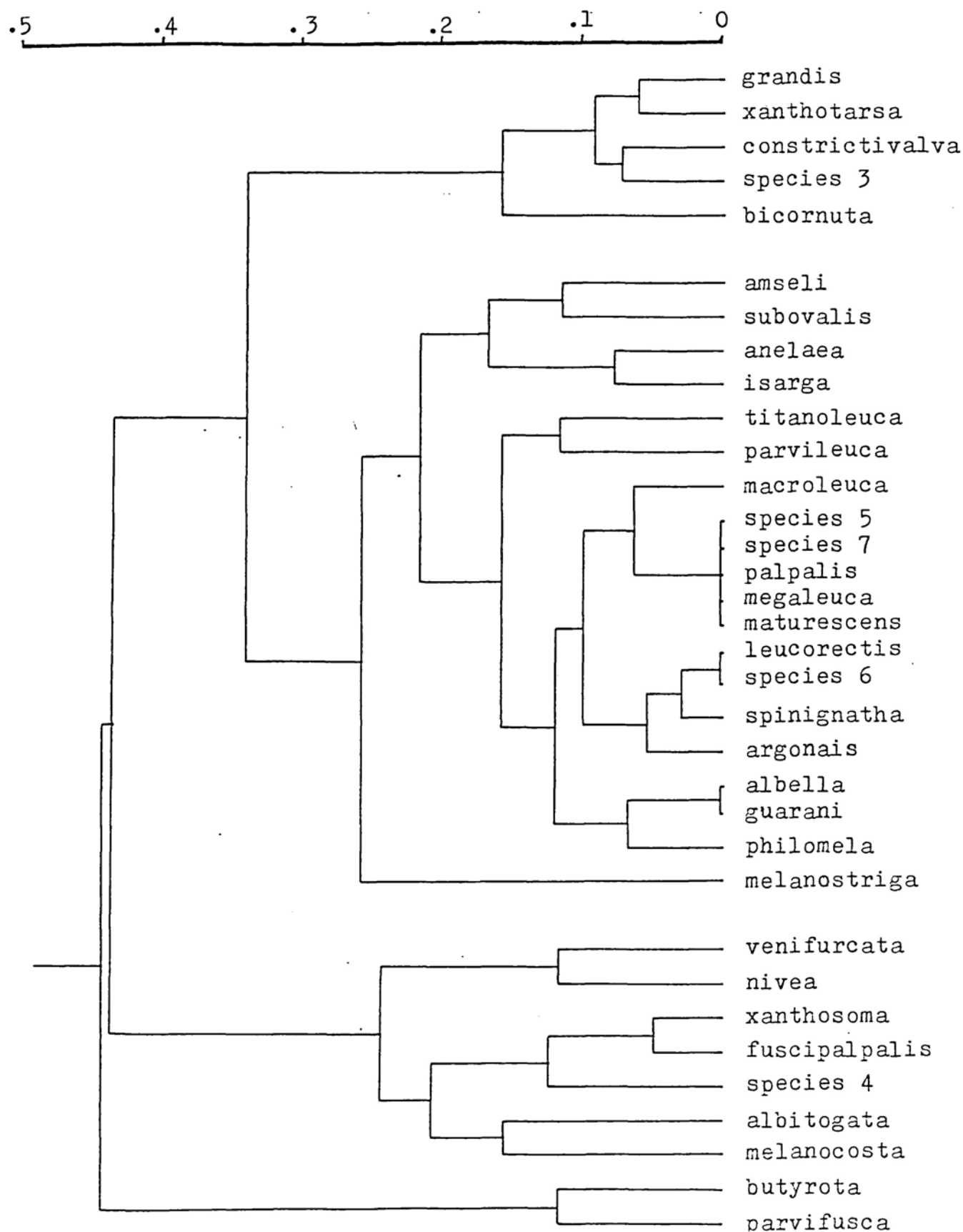


Fig. 14 Phenogram of the species of the albella-group of Timocratica calculated by weighted pair-group method of average linkage from matrix of between OTU Gower's coefficients using standardized and unstandardized data. Numbers at top denote magnitude of correlation coefficient.

TIMOCRATICA Meyrick

Timocratica Meyrick, 1912, Trans. ent. Soc. Lond. 1911:706.

Type-species: Timocratica isographa Meyrick, 1912. Ibidem 1911:707, [= Cryptolechia monotonia Strand, 1911], by original designation and monotypy.

Lychnocrates Meyrick, 1926, Exot. Microlepidopt. 3:226.

Type-species: Lychnocrates leucocapna Meyrick, 1926, Ibidem 3:227, by monotypy. [Synonymized by Busck, 1935:16.]

Timocratica Meyrick; Busck, 1935:16 [catalogue]; Clarke, 1955:384 [adult, genitalia, lectotype designation].

Lychnocrates Meyrick; Clarke, 1955:224 [adult, genitalia].

Vertex densely covered with long, narrow scales. Haustellum slightly shorter than second segment of labial palpi, covered basally with long scales, distal half with sensory papillae. Maxillary palpi four-segmented, about length of first segment of labial palpi. Labial palpi ascending, reaching to vertex or beyond; first segment very short, one-quarter length of second; second segment about twice length eye diameter, slightly curved upwards, with long rough scales below; third segment one-third to same size as second, smooth scaled, thick to slender, slightly curved upwards, or straight. Antennae three-quarters length of fore wings, ciliation one-half to twice diameter of flagellum. Thorax with or without dorsal crest, densely or sparsely covered with long hair-like scales below. Metascutum with pair of long, hair-like, posteriorly-directed groups of scales. Fore tarsi thickened by long scales; hind tibiae covered with long, rough, hair-like scales. Fore wings subrectangular

to suboval; apex rounded, pointed in few species; fuscous, often with three oblique fasciae, or plain white; twelve veins, eleven in nolo type of syndicastis [=butyrota], R_1 from middle of cell, R_2 closer to R_3 than to R_1 , R_4 and R_5 very close, connate or stalked; CuA_1 and CuA_2 very close, connate or stalked. Hind wings often golden-ocnreous to plain white. Abdomen long, robust, weakly sclerotized, reaching tornus in resting position, densely covered with narrow scales; males often with pair of coremata on second sternite; apodemes on second abdominal sternite short in females, modified in males to accommodate coremata; sternites two to seven with some small sparsely distributed setae; eight with several longer ones; first tergite as well as genitalia covered with long narrow scales; females with dorsal membrane between eighth and ninth segments expanded as wide inwardly-directed sac.

Genitalia ♂. Symmetrical. Uncus very broad basally, nearly triangular or with lateral margins nearly parallel, long, strong, bent ventrad, naked. Gnathos often belt-like, modified medially into strong, sclerotized, often pointed process. Juxta a transverse plate with two long, usually symmetrical, posteriorly-directed lobes covered distally with long setae. Vinculum complete, often rounded. Valvae long, broad, lateral margins nearly parallel or constricted basally, distal half covered on inner surface with many modified, strong, apically divided setae; ampulla and sacculus slightly or not differentiated, covered with very long setae. Aedeagus cylindrical, straight or bent ventrad;

inception of bulbus ejaculatorius basal, often on dorsal side of aedeagus; vesica often with one strong cornutus and many smaller, acutely-pointed spines.

Genitalia ♀. Papillae anales slightly to strongly sclerotized, sparsely covered with very long setae. Eighth segment strongly sclerotized, tergite with irregular row of long setae on posterior margin, sternite covered with very long setae. Apophyses anteriores and posteriores of same length or posteriores slightly longer. Ostium bursae narrow to broad; antrum cylindrical or conical; ductus bursae straight or bent posteriorly; corpus bursae nearly globular; signa present as plates with inwardly-directed spines; inception of ductus seminalis near ostium; walls of ductus and corpus bursae often scobinated.

REMARKS. In the right fore wing of the holotype of isographa the veins R_4 and R_5 have a short common stalk while the left shows the normal condition with R_4 and R_5 separate. This was noted by Meyrick in the original description, however, Clarke (1955:pl. 192, fig. 1a) illustrated the anomalous wing which is not representative of the venation of the monotonia-group.

PUPA. Pupae of only two species were available for this study: palpalis and melanocosta. The pupae of five further Stenominae species have been previously described in connection with the description of their larvae (see p. 62). The available information is therefore inadequate for generalizations about the taxonomic value of characters and the relationship of the Stenominae with other gelechioid groups.

The pupae of palpalis and melanocosta (see details for melanocosta) show the generalized gelechioid characters. But, like other stenominae they are slightly flattened dorso-ventrally and have the abdomen sharply curved ventrad, with the fifth, sixth and seventh segments free. They also have strong dorsal incisions on these three segments, allowing dorso-ventral movements only.

Two specializations are not shared by the other known pupae: the two long cremaster processes, called 'anal legs' by Powell (1973:26), and the peculiar projection of the pronotum (Fig. 113). The pair of 'anal legs', which anchors the pupa to the gallery walls, is also known in other gelechioid groups, for example in Ethmia Hübner, ethmiinae (Powell, 1973:26) and in Agonoxena Meyrick, Agonoxenidae (Bradley, 1966:468). It seems likely that they may be found in further stenominae. For the time being, the expansion of the pronotum can be used to distinguish T. palpalis and T. melanocosta from the other known pupae of Stenominae. However, no prediction can be made at this stage about its possible wider distribution in this subfamily.

LARVA. Larvae of only two species, palpalis and melanocosta, were available for this study, both belonging to the albella-group. As this group does not include monotonia, the type-species of the genus, it is not certain that the characters found in these two species are representative of the whole genus.

Apart from these, the larvae (and pupae) of only five stenomine species have been described: Antaeotricha dissimilis (Kearfott) (Becker, 1970), A. schlaegeri (Zeller) (Mackay, 1972), Stenoma crambina Busck (Dampf, 1929), S. decora (Zeller) (Silva & Heinrich, 1946) and S. ybyrajuba Becker (Becker, 1971). The available information is therefore inadequate for generalizations about the taxonomic value of characters, and the relationship of the Stenominae with other gelechioid groups. However, some characters are represented in a very similar pattern throughout the larvae of these seven species.

Like other gelechioids, the stenominae larvae have three prespiracular setae, L1, L2, L3, on the prothorax, and L1 and L2 on the same pinnaculum on abdominal segments 1-8. In Timocratica, and the other five, the adfrontal area of the head does not extend to the vertical angle and the setae P2 are separated from each other by the same distance as the P1's, or even less (Fig. 105). These characters are also found in the Xyloryctinae, whereas in all other gelechioids the distance between P2's is greater than that of P1's, and the adfrontal area reaches the posterior angle of the head, except in the Ethmiinae. According to

Powell (1973) in Ethmia the adfrontal area often reaches the vertical angle, but in a few species it does not. However, as in the other gelechioids, except for Stenominae and Xyloryctinae, the distance between the P2's is always greater than the distance of the P1's.

In an attempt to trace relationships among the gelechioids it was possible to examine the larvae of four Australian Xyloryctinae from the collection of the BMNH: Cryptophasa hyalinopa Lower, C. balteata Meyrick, Echiomima mythica Meyrick and Perixestis eucephala (Turner). All of these species also have the adfrontal area not reaching the vertical angle of the head and the distance between the P2's is almost the same as that of the P1's. Therefore it seems that the combination of both characters of the head, i. e. adfrontal area not reaching the vertical angle and the distance between P2's about the same as between P1's, is a good diagnostic feature for distinguishing the larvae of Stenominae and Xyloryctinae from those of other Gelechioidea.

The larvae of the two species of Timocratica described here can easily be distinguished from the other five known, as the former have the setae D's and SD's on meso and metathorax on the same pinnaculum, and a series of extra sclerotized areas, 'pinnacula without setae', on segments 2-3 of thorax and 1-7 of the abdomen.

Key to the species of Timocratica

Note. The males of albella, isarga, megaleuca, melanostriga, species 1, and species 3 to species 7, and the females of anelaea, constrictivalva, fuscipalpalis, guarani, macroleuca, maturescens, parvifusca, parvileuca, philomela, spinignatha, subovalis, titanoleuca, venifurcata, xanthotarsa, effluxa, agramma, fraternella, longicilia, pompeiana and species 2 are unknown.

- | | | |
|---|---|--------------------|
| 1 | Ground-colour of fore wings white (<u>albella</u> -group) | .14 |
| - | Ground colour of fore wings not white | 2 |
| 2 | (1) Fore wings with veins free (<u>leucocapna</u> -group) | . . . 4 |
| - | Fore wings with not all veins free | 3 |
| 3 | (2) Fore wings with R ₄ and R ₅ free (<u>monotonia</u> -group) | . 6 |
| - | Fore wings with R ₄ and R ₅ stalked. | <u>parvifusca</u> |
| 4 | (2) Hind wings edged with fuscous | <u>effluxa</u> |
| - | Hind wings not edged with fuscous | 5 |
| 5 | (4) Fore wings of males less than 23mm | <u>leucocapna</u> |
| - | Fore wings of males more than 25mm | species 2 |
| 6 | (3) Apex of fore wings pointed | <u>major</u> |
| - | Apex of fore wings rounded | 7 |
| 7 | (6) Hind wings golden-ochreous | 9 |
| - | Hind wings yellowish-fuscous or dark fuscous | 8 |
| 8 | (7) Abdomen golden-ochreous | species 1 |
| - | Abdomen golden-ochreous crossed with
fuscous bands | <u>fraternella</u> |

- 9 (7) Fore wings without distinctive fasciae . . . agramma
 - Fore wings with three distinctive fasciae . . . 10
- 10 (9) Antennae with ciliation clearly longer than
 diameter of flagellum longicilia
 - Antennae with ciliation about diameter of
 flagellum 11
- 11 (10) Second abdominal sternite without coremata. . loxotoma
 - Second abdominal sternite with coremata 12
- 12 (11) Coremata on second abdominal sternite
 in inverted pockets 13
 - Coremata on second abdominal sternite free,
 attached to the sternite surface meridionalis
- 13 (12) Male genitalia with margins of valvae
 nearly parallel monotonia
 - Male genitalia with margins not parallel,
 converging towards apex pompeiana
- 14 (1) Fore wings plain white 15
 - Fore wings marked with dark fuscous . . . melanostriga
- 15 (14) Hind wings plain golden-yellow 16
 - Hind wings white or tinged with yellow 20
- 16 (15) Fore tarsi fuscous 17
 - Fore tarsi golden-ochreous 19
- 17 (16) Fore wings with veins CuA_1 and CuA_2 stalked. species 3
 - Fore wings with veins CuA_1 and CuA_2 not stalked . . 18

- 18 (17) Gnathos basally with long, digitate
processes constrictivalva
- Gnathos basally without long,
digitate processes xanthotarsa
- 19 (16) Middle tarsi fuscous above grandis
- Middle tarsi golden-ochreous bicornuta
- 20 (15) Abdomen plain golden-ochreous above 21
- Abdomen white, or tinged with yellow, or
crossed with white bands above 27
- 21 (20) Hind wings plain white 22
- Hind wings tinged with yellow species 4
- 22 (21) Fore wings with R_4 and R_5 stalked . . . venifurcata
- Fore wings with R_4 and R_5 not stalked 23
- 23 (22) Fore wings with base of costa fuscous 24
- Fore wings with base of costa not fuscous 25
- 24 (23) Head with vertex golden-
yellow xanthosoma-xanthosoma
- Head with the vertex white.. xanthosoma leucocephala
- 25 (23) Second segment of labial palpi almost
fuscous externally fuscipalpalis
- Second segment of labial palpi almost
ochreous externally 26
- 26 (25) Vesica with strong cornutus and many
smaller spines subovalis
- Vesica with strong cornutus only amseli

27	(20)	Abdomen golden-ochreous crossed with white bands above	<u>anelaea</u>
-		Abdomen white or tinged with yellow above . .	28
28	(27)	Hind tarsi plain white	29
-		Hind tarsi golden-yellow, or tinged with yellow..	33
29	(28)	Fore tarsi white above	30
-		Fore tarsi fuscous above	<u>isarga</u>
30	(29)	Abdomen tinged with yellow above	31
-		Abdomen plain white above	32
31	(30)	Frons white edged with fuscous	<u>guarani</u>
-		Frons plain white	<u>albella</u>
32	(30)	Fore wings with costa dark grey basally. .	<u>melanocosta</u>
-		Fore wings with costa white basally	<u>nivea</u>
33	(28)	Fore tarsi white above	34
-		Fore tarsi dark fuscous above	36
34	(33)	Abdomen and underside of wings plain white. .	<u>albitogata</u>
-		Abdomen and underside of wings tinged with yellow	35
35	(34)	Second segment of labial palpi golden- yellow below	<u>macroleuca</u>
-		Second segment of labial palpi dark fuscous below	<u>titanoleuca</u>
36	(33)	Hind wings tinged with yellow above	37
-		Hind wings white above	41
37	(36)	Second segment of labial palpi golden-yellow below	39
-		Second segment of labial palpi dark fuscous below	38

- 38 (37) Fore wings with R_4 and R_5 stalked butyrota
 - Fore wings with all veins free parvileuca
- 39 (37) Abdomen white above 40
 - Abdomen tinged with yellow above . . spinignatha
- 40 (39) Fore wings more than 20mm species 6
 - Fore wings less than 15mm philomela
- 41 (36) Second segment of labial palpi
 white internally 42
 - Second segment of labial palpi almost
 golden ochreous maturescens
- 42 (41) Fore femora dark fuscous above 43
 Fore femora yellow above 44
- 43 (42) Fore wings below white along apex and
 termen palpalis+megaleuca
 - Fore wings below dark fuscous along
 apex and termen argonais
- 44 (42) Middle femora yellow above species 7
 - Middle femora white above 45
- 45 (44) Fore wings more than 25mm leucorectis
 - Fore wings less than 20mm species 5

Check-list of the species of TimocraticaTIMOCRATICA Meyrick, 1912Lychnocrates Meyrick, 1926albella-group

<u>albella</u> (Zeller, 1839)	Surinam
<u>albitogata</u> sp. n.	Brazil
<u>amseli</u> Duckworth, 1962, sp. rev.	Venezuela
<u>albella</u> Amsel, 1956, nom. preocc.	
<u>anelaea</u> (Meyrick, 1932)	Brazil
<u>argonais</u> (Meyrick, 1932)	Brazil, British
<u>argonias</u> Clarke, 1955, misspelling	Guiana, French Guiana
<u>bicornuta</u> sp. n.	Brazil
<u>butyrota</u> (Meyrick, 1929), comb. n.	Colombia, Costa Rica,
<u>syndicastis</u> (Meyrick, 1929), syn. n.	Panamá, Peru
<u>constrictivalva</u> sp. n.	Ecuador
<u>fuscipalpalis</u> sp. n.	Venezuela
<u>grandis</u> (Perty, [1833])	Brazil, French
	Guiana, Panama
<u>guarani</u> sp. n.	Argentina, Paraguay
<u>isarga</u> (Meyrick, 1925)	Bolivia
<u>leucorectis</u> (Meyrick, 1925)	Bolivia, Brazil,
	French Guiana,
	Colombia, Peru

<u>macroleuca</u> (Meyrick, 1932)	Bolivia
<u>maturescens</u> (Meyrick, 1925)	Colombia, French Guiana, Venezuela
<u>megaleuca</u> (Meyrick, 1912)	Colombia
<u>melanocosta</u> sp. n.	Brazil
<u>melanostriga</u> sp. n.	Brazil
<u>nivea</u> sp. n.	Brazil
<u>palpalis</u> (Zeller, 1877)	Argentina, Bolivia,
<u>auxoleuca</u> (Meyrick, 1925)	Brazil
<u>haywardi</u> Busck, 1939, syn.n.	
<u>parvifusca</u> sp. n.	Costa Rica
<u>parvileuca</u> sp. n.	Brazil
<u>philomela</u> (Meyrick, 1925)	Peru
<u>spinignatha</u> sp. n.	Peru
<u>subovalis</u> (Meyrick, 1932)	Brazil
<u>stomatocosma</u> (Meyrick, 1932), syn. n.	
<u>titanoleuca</u> sp. n.	Peru
<u>venifurcata</u> sp. n.	Brazil
<u>xanthosoma xanthosoma</u> (Dognin, 1913)	French Guiana
<u>sacra</u> (Meyrick, 1918)	
<u>xanthosoma leucocephala</u> ssp. n.	Colombia, Panama
<u>xanthotarsa</u> sp. n.	Panama
species 3	Peru
species 4	French Guiana

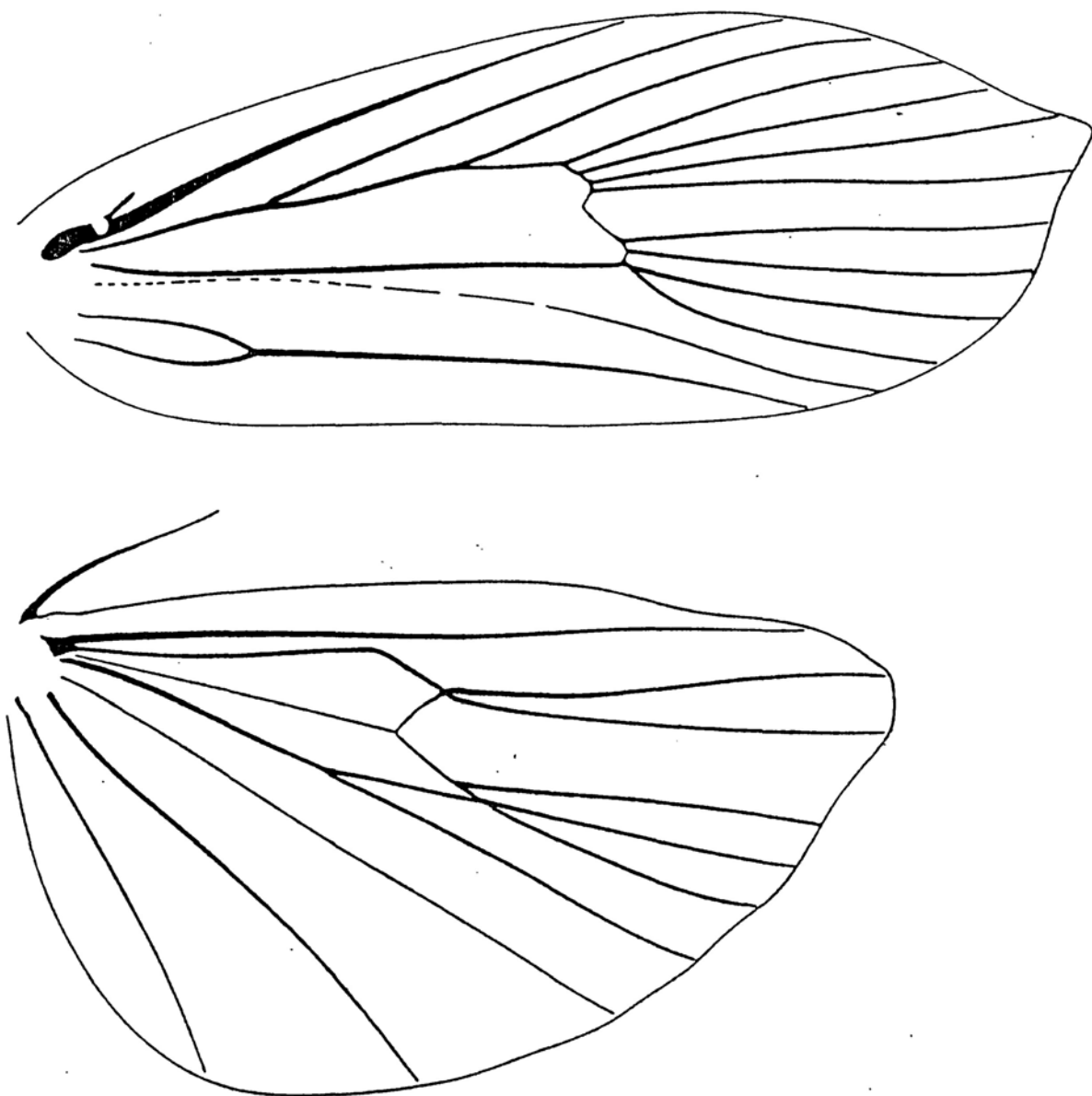
species 5	Brazil
species 6	Brazil
species 7	Colombia
<u>leucocapna-group</u>	
<u>effluxa</u> (Meyrick, 1930)	Bolivia
<u>leucocapna</u> (Meyrick, 1926), comb. rev.	Colombia, Costa Rica, Peru, Venezuela
species 2	Peru
<u>monotonia-group</u>	
<u>agramma</u> sp. n.	Brazil
<u>fraternella</u> (Busck, 1910)	Costa Rica
<u>longicilia</u> sp. n.	Colombia
<u>loxotoma</u> (Busck, 1909)	Costa Rica, Guatemala, Mexico
<u>major</u> (Busck, 1911)	Brazil, Peru
<u>meridionalis</u> sp. n.	Brazil, Paraguay, Bolivia
<u>monotonia</u> (Strand, 1911)	Brazil, British Guiana, Colombia,
<u>claudescens</u> Meyrick, 1925, syn. n.	Ecuador
<u>crassa</u> Meyrick, 1925, syn. n.	
<u>isographa</u> Meyrick, 1912, syn. n.	
<u>pompeiana</u> Meyrick, 1925	Peru
species 1	Costa Rica

The monotonia-group

♂, ♀, 14-30mm. Head, thorax above, and fore wings fuscous. Third segment of labial palpi about two-thirds as long as second, ascending vertex very close to head. Thorax with crest of long, narrow scales (Fig. 9). Fore wings with apex rounded, acute in major; CuA₁ and CuA₂ stalked at basal quarter; three oblique, nearly parallel fasciae crossing wings, except for agramma. Hind wings often pale to golden-ochreous, fuscous in fraternella. Abdomen ochreous, crossed with fuscous bands in fraternella; coremata absent in loxotoma and fraternella, on surface of sternite in meridionalis (Figs 10-12).

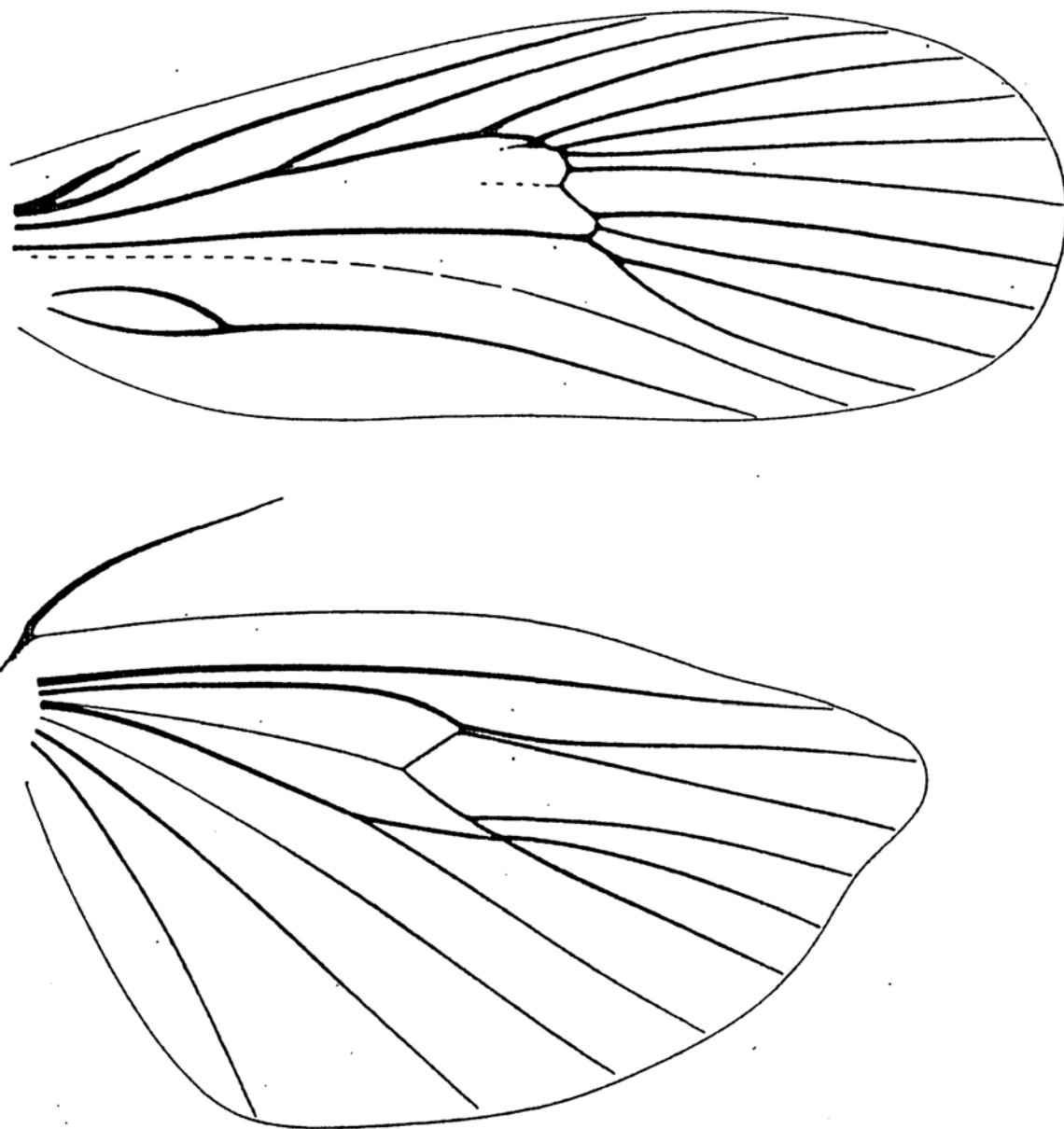
Genitalia ♂. Digitate processes of juxta not reaching anterior margin of gnathos apex, except for major.

REMARKS. The species of this group can easily be distinguished from others by their crest of long scales on the thorax; from the albella-group also by their fuscous colour, from the leucocapna-group by the stalked veins CuA₁ and CuA₂ of the fore wings, and from parvifusca by the larger size and veins R₄ and R₅ on the fore wings free.



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Fig. 15 Wing venation of Timocratica major (Busck).



V. 3
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Fig. 16 Wing venation of Timocratica monotonia (Strand).

Timocratica major (Busck)

(Figs 15, 17, 19, 20, 26)

Stenoma major Busck, 1911, Proc. U. S. natn. Mus. 40:212;
pl. 8, fig. 8. Holotype ♂, PERU: Lima, Callao (Pusey)
(NMNH, Washington, no. 13567) [not examined].

Timocratica major (Busck); Meyrick, 1912:707 [list];
Busck, 1935:17 [catalogue].

♂ 22-25mm. Head pale yellow, ochreous towards clypeus; vertex and crown with grey and ochreous-tipped scales. Second segment of labial palpi ochreous, whitish internally above; third segment whitish. Antenna pale yellow, scape with greyish-tipped scales; flagellum progressively fuscous from base to apex, ciliation half of flagellum diameter. Thorax pale yellow with greyish and ochreous-tipped scales. Fore wings with apex pointed, pale yellow; margins, oblique fasciae, and fold ochreous; underside golden-ochreous. Hind wings pale golden-yellow, cilia golden. Legs ochreous, paler above; fore tarsi dark ochreous on outer side. Abdomen ochreous.

♀ 25-26mm. Slightly darker than male. Fore wings irrorated with ferrugineous scales; margins, fasciae, fold and cilia ferrugineous.

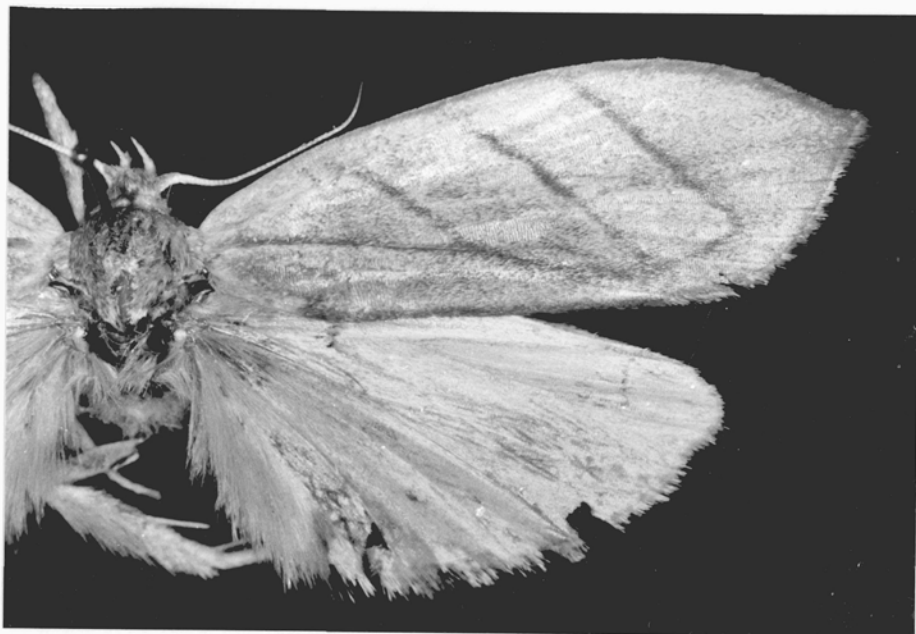


Fig. 17 Timocratica major (Busck), ♀, Brazil (BMNH).

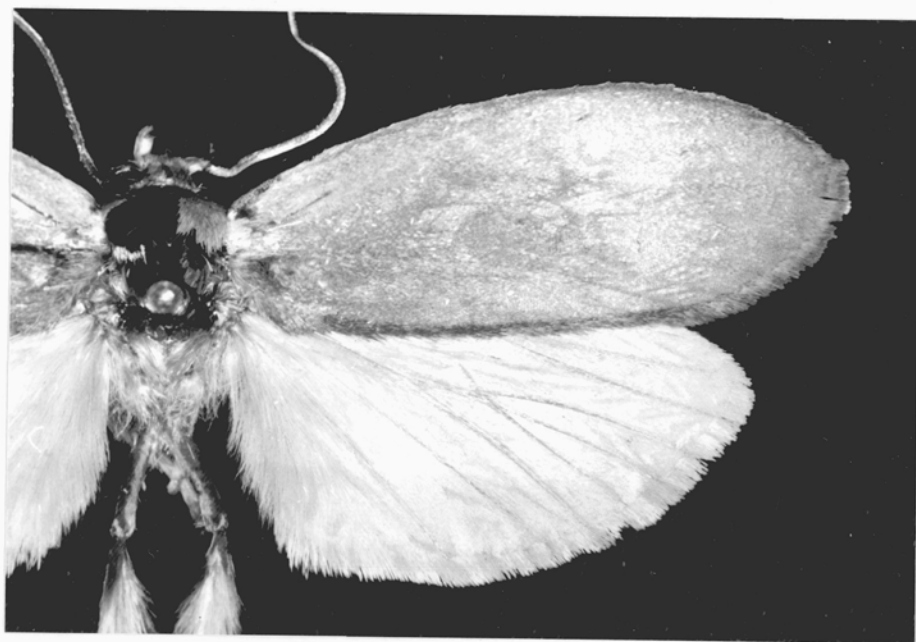


Fig. 18 Timocratica agramma sp. n., ♂, holotype,
Brazil (NMNH, Washington).

Genitalia ♂ (Fig.19). Uncus slightly narrowed at middle; apex strongly concave, nearly bifurcate. Apex of gnathos blunt. Digitate processes of juxta narrow and long, overlapping proximal side of gnathos, curved inwards, covered with setae towards apex. Anterior margin of vinculum nearly straight. Valvae broadening progressively distalwards; sacculus slightly expanded; apex evenly rounded. Aedeagus bent ventrad at base, slightly dilateted medially; vesica with single strong cornutus.

Genitalia ♀ (Fig.20). Ostium bursae narrow, margin straight. Antrum short. Ductus bursae about twice as long as corpus bursae, nearly cylindrical, walls slightly wrinkled. Corpus bursae globular, walls smooth. signum an elongate plate, slightly constricted at middle, weakly sclerotized along and across middle.

REMARKS. T. major is easely separated by its pointed fore wings, which are rounded in all other species in the group.

Busck (1911) stated that the median and post-median fasciae reach the dorsum, but they merely reach the fold, and the post-median forms an acute angle on M_3 with a fascia that follows the fold, parallel to the tornus. Busck also stated that the alar expanse was 50-60mm, but it was impossible to find specimens larger than 55mm amongst the material studied. The presence of a thoracic crest in this species is not clear. All the specimens examined have the thorax more or less rubbed, except one which has some long, loose scales around the pin, which

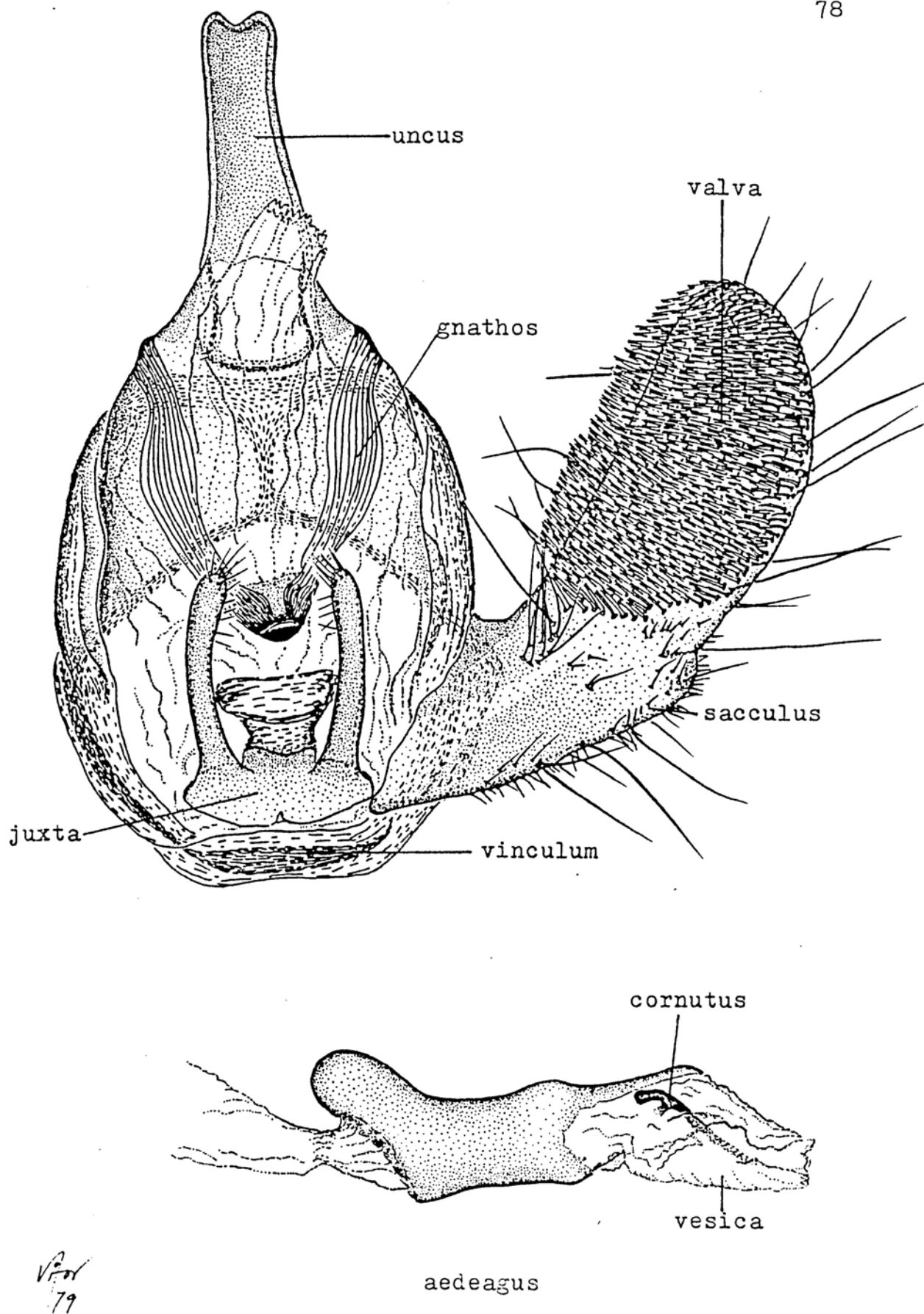


Fig. 19 Genitalia of *Timocratica major* (Busck), ♂, Brazil (slide no. 505; colln V. Becker, Brazil).

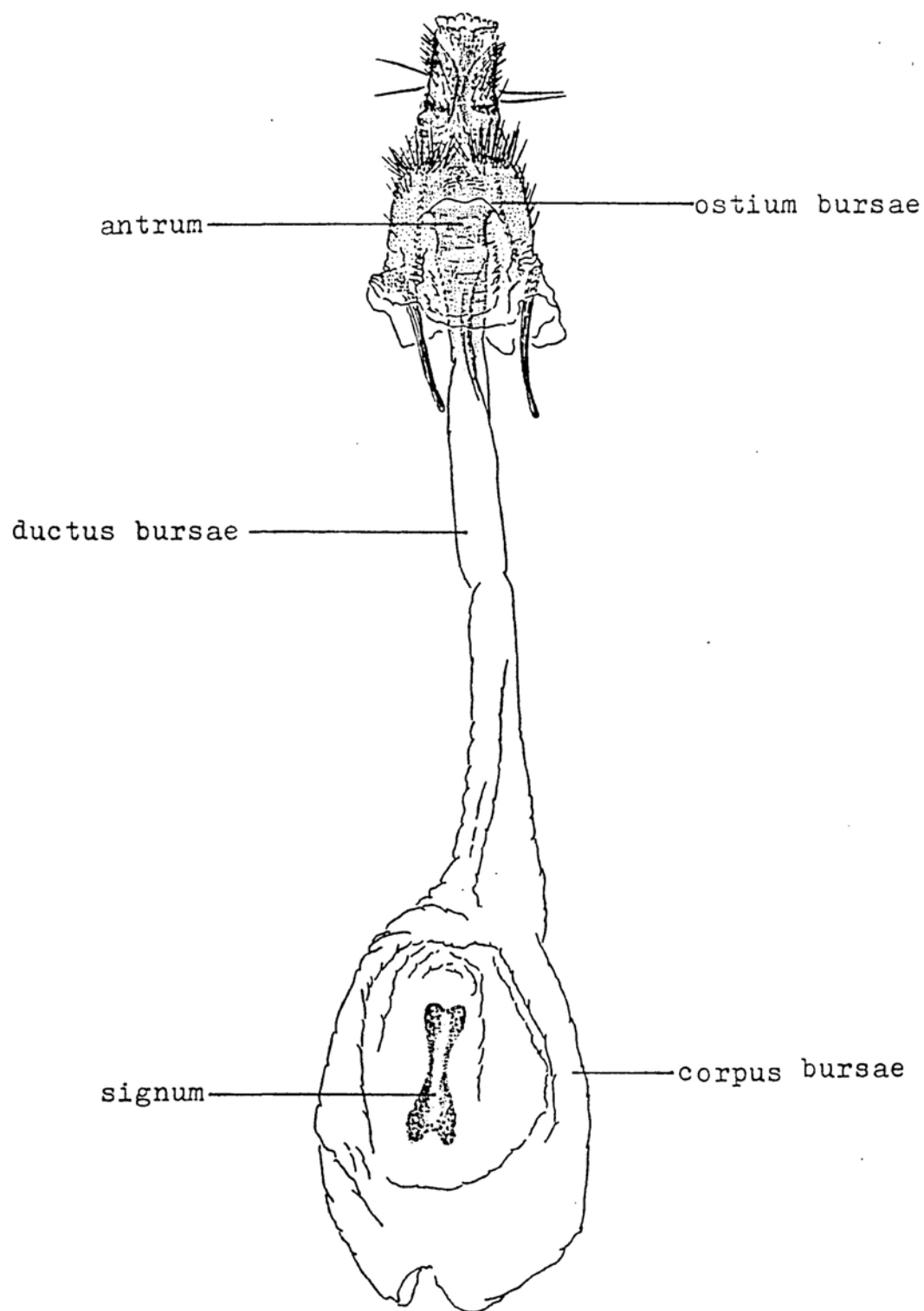


Fig. 20 Genitalia of *Timocratica major* (Busck),
♀, Brazil (slide no. 21033; BMNH).

may indicate the presence of this character. The shape of the juxta and valvae is somewhat unusual for this group. No other species has the digitate processes of the juxta overlapping the proximal side of the gnathos, nor the characteristic expansion of the sacculus. This is also the only species in the genus with such a long ductus bursae.

BIOLOGY. Moths have been collected in July and October in Amazonas and in October in Goiás and Mato grosso.

DISTRIBUTION (Fig. 26). Brazil (Amazonian Basin and Central Plateau), and Peru (Pacific Coast [probably a mislabelling as discussed below]). This species is presumably associated to the Tropical Moist Forest as indicated by the specimens collected in Borba and Ponte Boa, Amazonas, which are represented by the dots in the lowest hexagon on the figure. The specimens from 'Callao, Peru', are probably mislabeled as this locality is in a desert area, Subtropical Semiarid Desert in Holdridge's system (Fig. 1). The specimens from Mato Grosso and Goiás come from an area covered predominantly by a non-climatic association. This area is covered by two associations. Most of the area, the savanna-type vegetation, called 'cerrado' in Brazil, is a result of the monsoon-type of rainfall, what corresponds to an 'atmospheric association' in Holdridge's system. The other association is represented by the gallery-forests along the river banks. As there is no shortage of water, the resulting vegetation is more exuberant than that of the savanna area.

So that, these gallery forests represent the climatic association of the area. Thus, the two dots which represent the two localities in Goiás and Mato Grosso in the figure could be moved further to the right side, probably over the 2000-precipitation line, falling very close to the other two dots which represent the most probably ecological distribution of major.

MATERIAL EXAMINED.

9 ex. (8 ♂, 1 ♀; 4 ♂, 1 ♀ genitalia preparations).

Peru: Lima, Callao (Pusey) (BMNH), (paratype ♂);
Brazil: 5 ♂, Mato Grosso, Rio Brilhante, 22.x.1970
(Becker) (colln V. Becker, Brazil, no. 16090; BMNH;
NMNH, Washington); 1 ♀, Amazonas, Fonte Boa, vii.1906
(Klages) (BMNH); 1 ♂, Amazonas, Borba, Rio Madeira,
x.1943 (Pohl) (NMNH, Washington); 1 ♂, Goiás, Leopoldo
Bulhões, x.1935 (Spitz) (BMNH).

Timocratica agramma sp. n.

(Figs 18, 21, 26)

♂ 30mm. Head fuscous. Labial palpi dark ochreous; second segment above and third segment fuscous. Antennae fuscous. Thorax fuscous, crest dark brown. Fore wings fuscous, costa ferrugineous-ochreous, dorsum ferrugineous, oblique fasciae indistinct; underside golden-yellow, deep golden-yellow along margins. Hind wings golden-ochreous, cilia and dorsum deep golden-ochreous. Legs deep golden-ochreous, fore tarsi dark fuscous above; third to fifth segments of middle tarsi fuscous brown.

Genitalia ♂ (Fig.21). Uncus narrow, lateral margins nearly parallel; apex medially concave. Apex of gnathos sharply pointed, strongly sclerotized. Digitate processes of juxta straight, apex with several setae. Valvae with lateral margins nearly parallel, basal third of ventral margin slightly sinuous. Aedeagus slightly bent ventrad, vesica with a single strong, pointed cornutus.

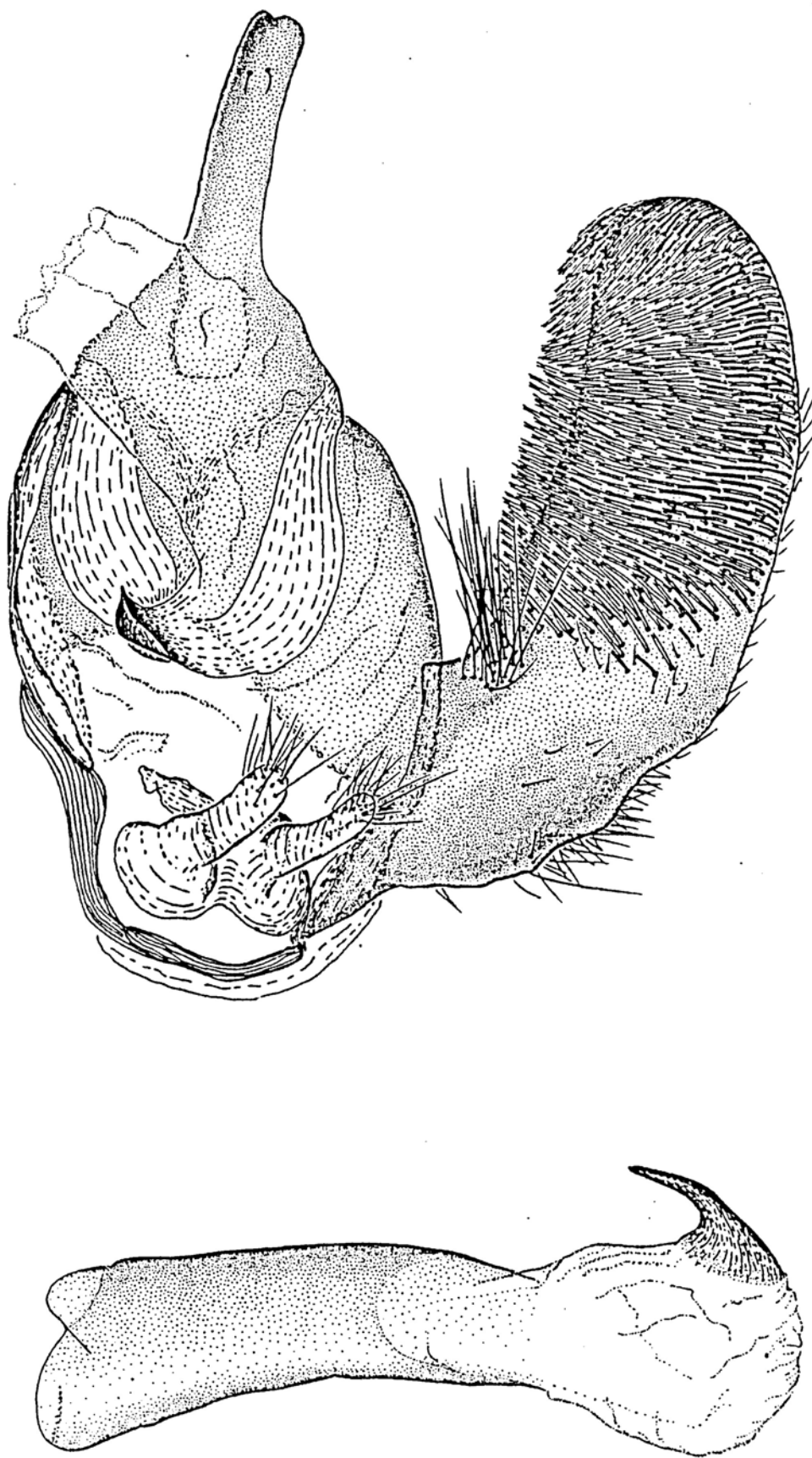
REMARKS. T. agramma is easily separated from others in this group by the absence of distinctive oblique fasciae on the fore wings.

BIOLOGY. Unknown.

DISTRIBUTION (Fig.26). Brazil (East Atlantic coast). The data on the label, 'Espirito Santo', of the only specimen known is not precise enough. But, can be assumed that the specimen was collected in the lowlands around the capital, Vitoria, and the species may belong to a transitional association between the Tropical Dry Forest and the Subtropical moist forest.

MATERIAL EXAMINED.

Holotype ♂, Brazil: Espirito Santo (Johnson) (genitalia slide, Busck; NMNH, Washington, no. 76653).



V. 21
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Fig. 21 Genitalia of Timocratica agramma sp. n., ♂, holotype, Brazil (slide, Busck; NMNH, Washington).

Timocratica longicilia sp. n.

(Figs 22, 24, 26)

♂ 28-30mm. Head fuscous, frons whitish edged with ochreous and fuscous scales, vertex and crown brownish fuscous. Second segment of labial palpi dark ochreous, brownish fuscous above; third segment brownish fuscous. Antennae pale yellow, scape fuscous, distal half of flagellum progressively darker towards apex, ciliation one and half times diameter of flagellum. Thorax fuscous, dark brown along middle, apex of crest scales dark brownish-fuscous. Fore wings light fuscous; costa ochreous to ferrugineous; termen, dorsum, oblique fasciae and cilia fuscous; golden-yellow below. Hind wings golden-yellow, cilia deep golden-yellow. Legs deep golden-yellow; fore tarsi brownish-fuscous above, darker outwardly; middle tarsi above slightly tinged with fuscous. Abdomen deep ochreous, fourth to seven tergites tinged with brownish fuscous.

Genitalia ♂ (Fig. 22). Uncus broad, lateral margins converging slightly towards apex, apex slightly concave. Apex of gnathos folded, unlike other species not strongly sclerotized. Digitate processes of juxta short, dorsal side and apex with several setae. Valvae very broad, costal margin nearly straight, ventral margin evenly rounded. Aedeagus bent ventrad, Vesica with a single, broad-based, sharply-pointed cornutus.

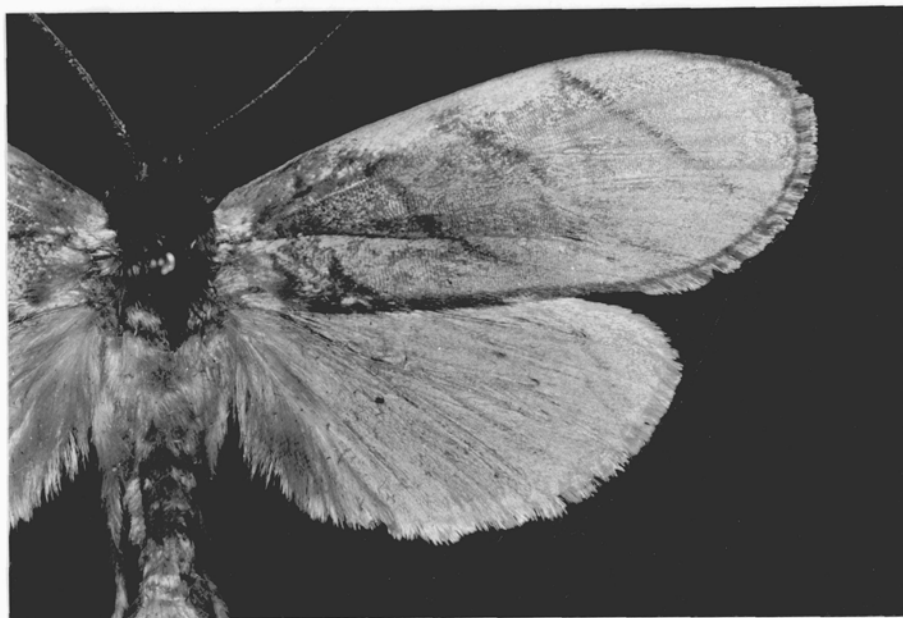


Fig. 22 Timocratica longicilia sp. n., holotype,
Colombia (BMNH).



Fig. 23 Timocratica meridionalis sp. n., ♂, holotype,
Brazil (MN, Rio de Janeiro).

REMARKS. T. longicilia can easily be distinguished from other species in this group by its relatively long antennal ciliation and by the brownish-fuscos third segment of its labial palpi. It is the only species in the group which has the base of the valvae narrower than the distal part. As major and agramma, from which it is very distinct externally, it has a single strong cornutus in the vesica. The specimen from Antioquia, Mesopotamia has the distal half of the valvae slightly narrower than the typical form. Possibly it is a lowland form of the species.

BIOLOGY. One of the paratypes was collected in December.

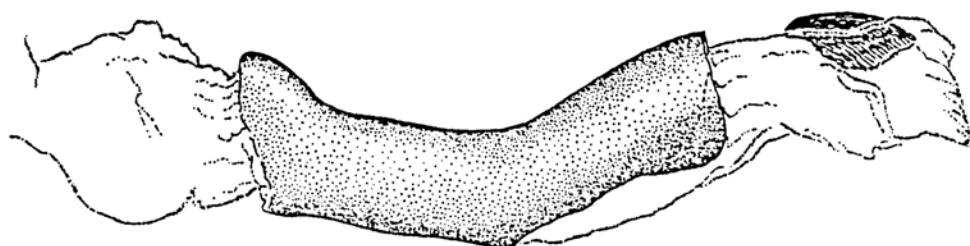
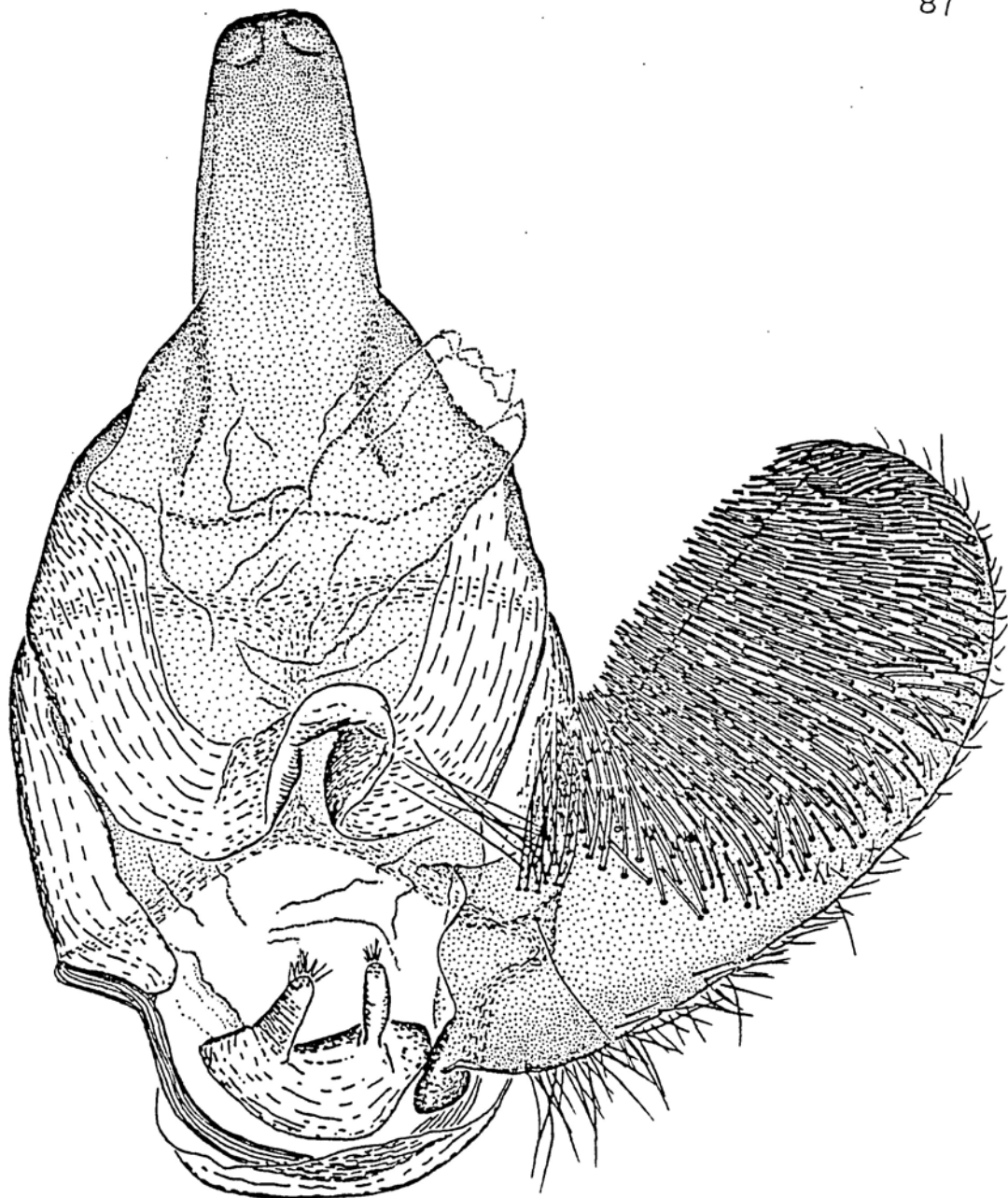
DISTRIBUTION (Fig.26). Colombia (Oriental Cordillera and Mesopotamia). This species represents the genus in the high mountains of Colombia, in the Tropical Montane and Tropical Lower Montane wet forest. No other species in the genus is known to occur in these two Life zones.

MATERIAL EXAMINED.

3 ♂ (2 ♂ genitalia preparations).

Holotype ♂, Colombia: Tolima, mt. Tolima, 3200m (Fassl) (BMNH).

Paratypes. Colombia: 1 ♂, Tolima, Mt. del Eden, Ibagué, 2700m, xii.1909 (Fassl) (BMNH); 1 ♂, Antioquia, Mesopotamia, 1500m ('5000 ft') (NMNH, Washington).



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Fig. 24 Genitalia of Timocratica longicilia sp. n., ♂, paratype, Colombia (slide no. 20994; BMNH).

Timocratica pompeiana (Meyrick)

(Figs 25, 27, 35)

Timocratica pompeiana Meyrick, 1925, Exot. Microlepidopt.

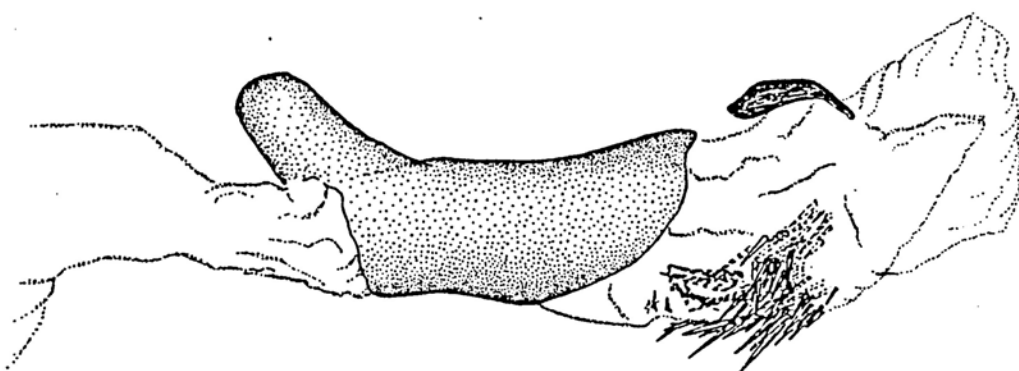
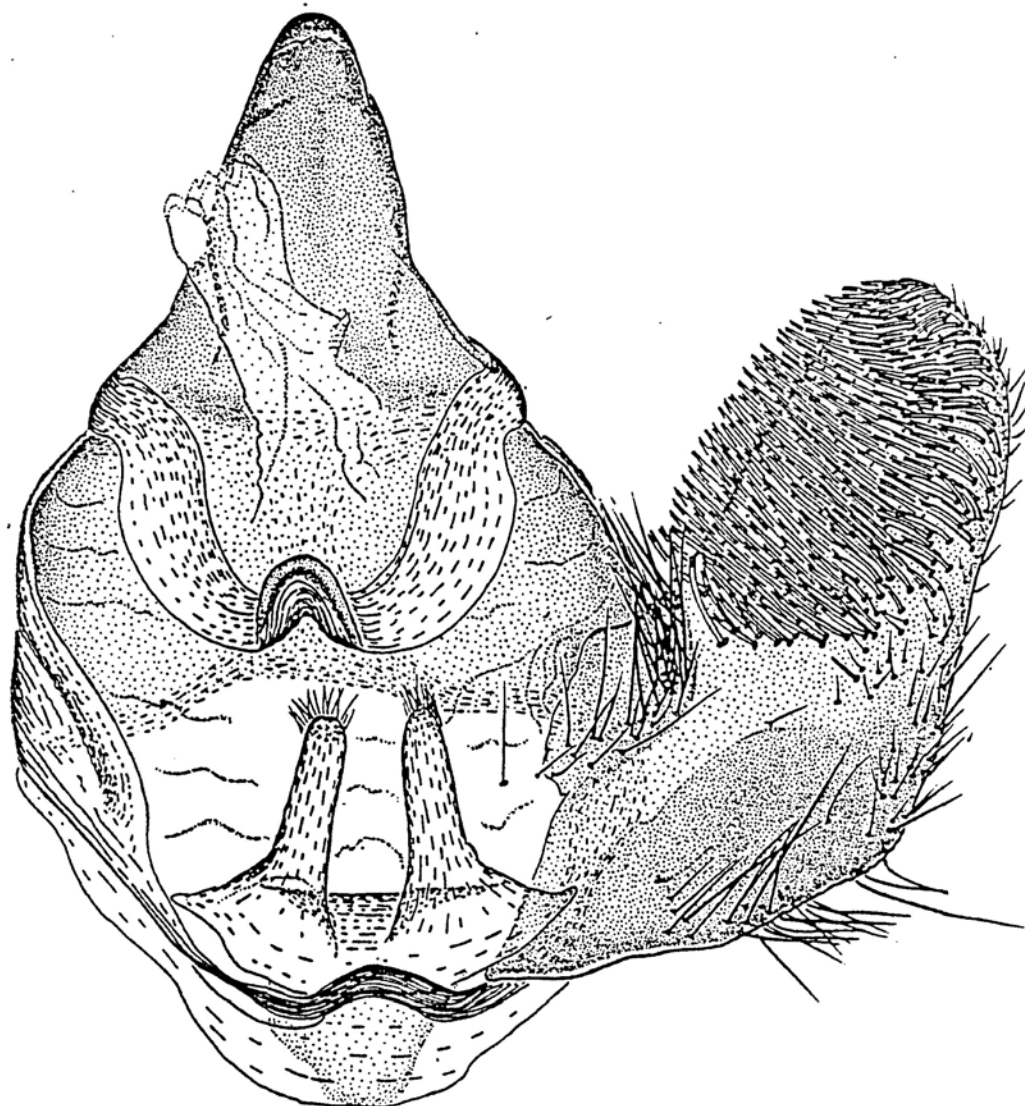
3:176. Holotype ♂, PERU: Carabaya, La Oroya (genitalia slide 4965, Clarke; BMNH) [examined].

Timocratica pompeiana Meyrick; Busck, 1935:17 [catalogue];

Clarke, 1955:391; pl. 195, figs 4-4b [adult, genitalia].

♂ 27-30mm. Head whitish, frons edged with fuscous, vertex and crown with fuscous scales. Second segment of labial palpi with basal half ochreous, dark grey above, outer half above and near articulations whitish; third segment whitish, fuscous below. Antennae fuscous; scape whitish, basal half above with fuscous scales. Thorax fuscous, dark fuscous along middle; crest dark brown, patagia pale yellow, tegulae fuscous. Fore wings fuscous, costa deep ochreous to ferrugineous brown, termen, dorsum, oblique fasciae and fold ferrugineous brown, cilia fuscous, dark ochreous below. Hind wings golden-ochreous, cilia and dorsum deep golden-ochreous. Legs deep golden-ochreous, fore tarsi fuscous above, dark brown on claws; middle tarsi and third to fifth segments of hind tarsi fuscous brown above. Abdomen deep golden-ochreous.

Genitalia ♂ (Fig.25). Uncus nearly triangular, base broad, tapering strongly towards apex. Apex of gnathos flat and rounded. Digitate processes of juxta straight, dorsal side of apex with several setae. Valvae very broad basally, ventral



V. J. J.
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Fig. 25 Genitalia of Timocratica pompeiana Meyrick, ♂, Peru (slide no. 20992; BMNH).

margin strongly curved near middle. Aedeagus bent ventrad at basal third, vesica with strong, bent cornutus and several smaller spines opposite.

REMARKS. T. pompeiana is a little larger than monotonia but otherwise very similar externally. The only difference is in the shape of the valva; in pompeiana it is nearly triangular with a very broad base, while in monotonia the margins are almost parallel. T. pompeiana could be a local form of monotonia, as variation of genitalia has been found in different populations of the latter. This view is supported by the ecological distribution of both forms as discussed below. However, pompeiana is retained as a different species until further material and information is available.

BIOLOGY. Moths have been collected in March.

DISTRIBUTION (Fig. 35). Peru (Eastern side of the Andes). All specimens were collected in the same place. The locality is in the Tropical Premontane wet Forest. This is also the Life Zone of monotonia and suggests that pompeiana could be a local form of that species.

MATERIAL EXAMINED.

4 ♂ (2 ♂ genitalia preparations).

Peru: 4 ♂, Puno, Carabaya, La Oroya, R. Inambari, iii.

1905 (Ockenden) (BMNH).

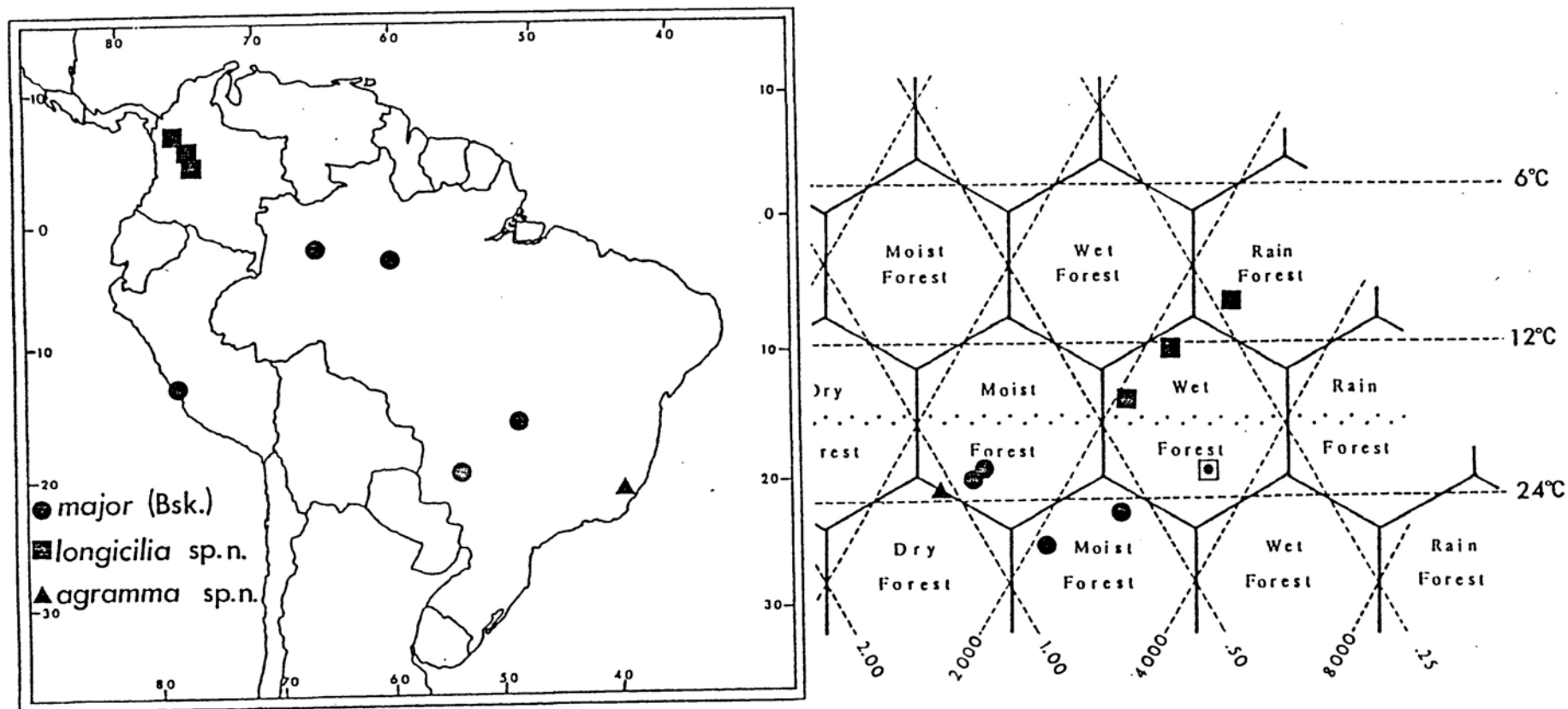


Fig. 26 Geographical and ecological distribution of the monotonia-group of Timocratica.

Timocratica monotonia (Strand)

(Figs. 6, 9, 10, 16, 28, 29-31, 34, 35)

Cryptolechia monotonia Strand, 1911, Ent. Rdsch. 28:151.Holotype ♀, ECUADOR: Macas (colln Niepelt) [not traced].Timocratica isographa Meyrick, 1912, Trans. ent. Soc. Lond.

1911:707. Holotype ♂, VENEZUELA: Falcón, palma Sola

(genitalia slide 4960, Clarke; BMNH) [examined]. Syn. n.Cryptolechia monotonia Strand; Strand, 1914:58; pl. 11,

fig. 18 [redescr., adult].

Timocratica claudescens Meyrick, 1925, Exot. Microlepidopt.

3:177. Lectotype ♂, PERU: puno, Sán Gabán, iv.1913

(genitalia slide 4963, Clarke; BMNH), designated by

Clarke (1955:387) [examined]. Syn. n.

Timocratica crassa Meyrick, 1925, Exot. Microlepidopt. 3:177.

Lectotype ♂, BRAZIL: Pará, Belém ('Para'), vii.1919

(Parish) (genitalia slide 4962, Clarke; BMNH), designated

by Clarke (1955:388) [examined]. Syn. n.

Timocratica isographa Meyrick; Meyrick, 1925:176 [addition

to descript.]; Busck, 1935:17 [cat.]; Clarke, 1955:384;

pl. 192, figs 1-1d [adult, wing venation, genitalia].

Timocratica claudescens Meyrick; Busck, 1935:16 [catalogue];

Clarke, 1955:387; pl. 193, figs 4-4a [adult, genitalia].

Timocratica crassa Meyrick; Busck, 1935:16 [catalogue];

Clarke, 1955:388; pl. 194, figs 1-1a [adult, genitalia].

Timocratica monotonia (Strand); Busck, 1935:17 [catalogue].

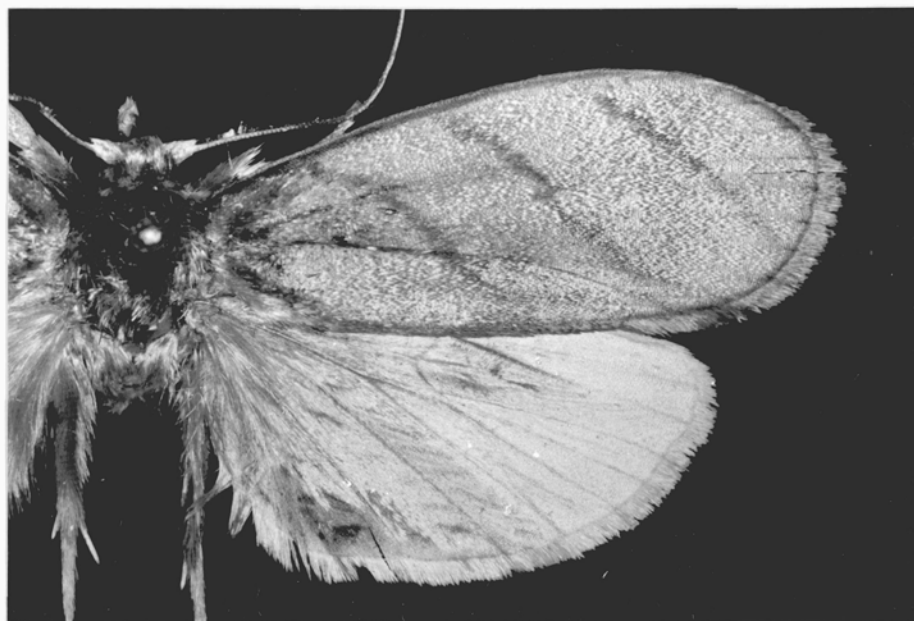


Fig. 27 Timocratica pompeiana Meyrick, ♂, Peru (BMNH).

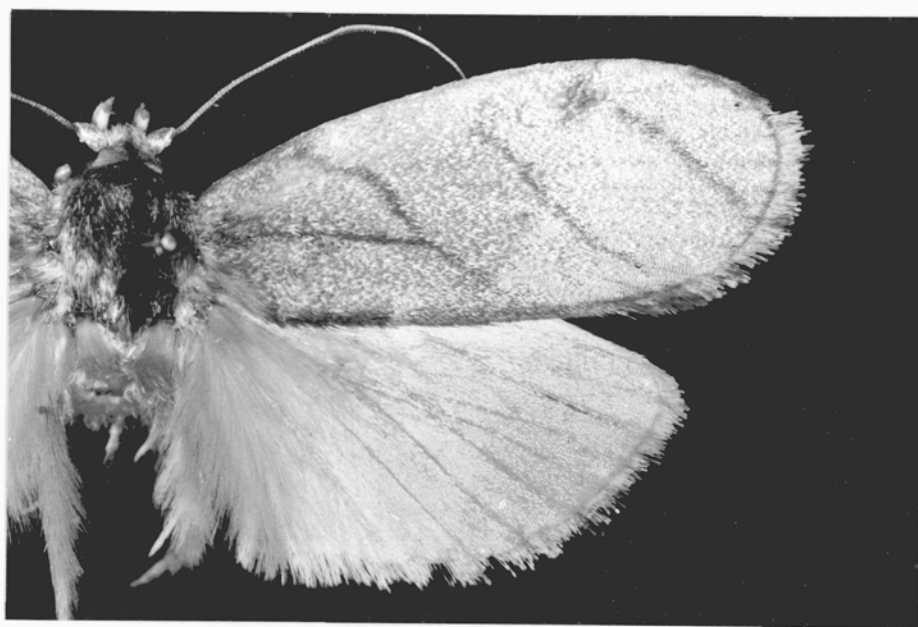
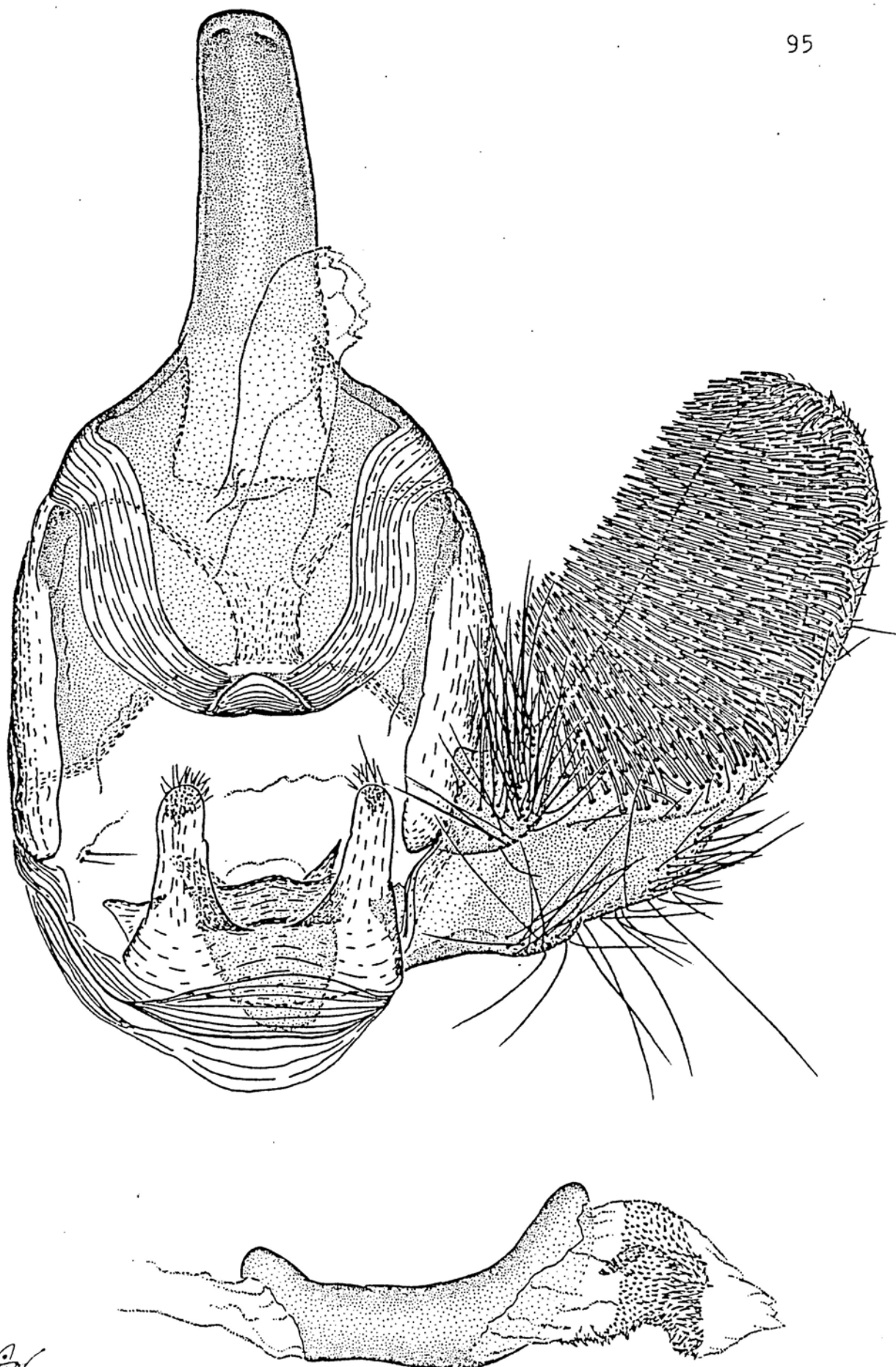


Fig. 28 Timocratica monotonia (Strand), ♂, Venezuela
(colln V. Becker, Brazil, no. 35016).

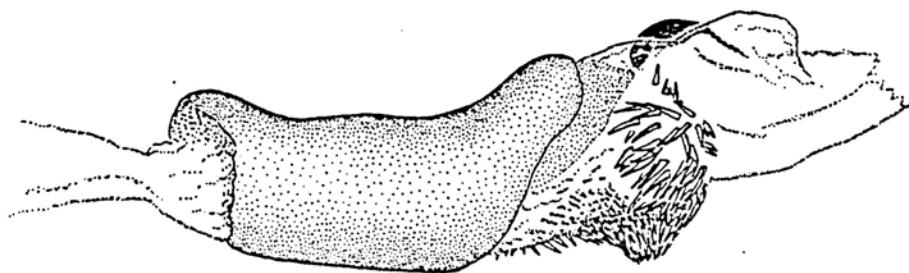
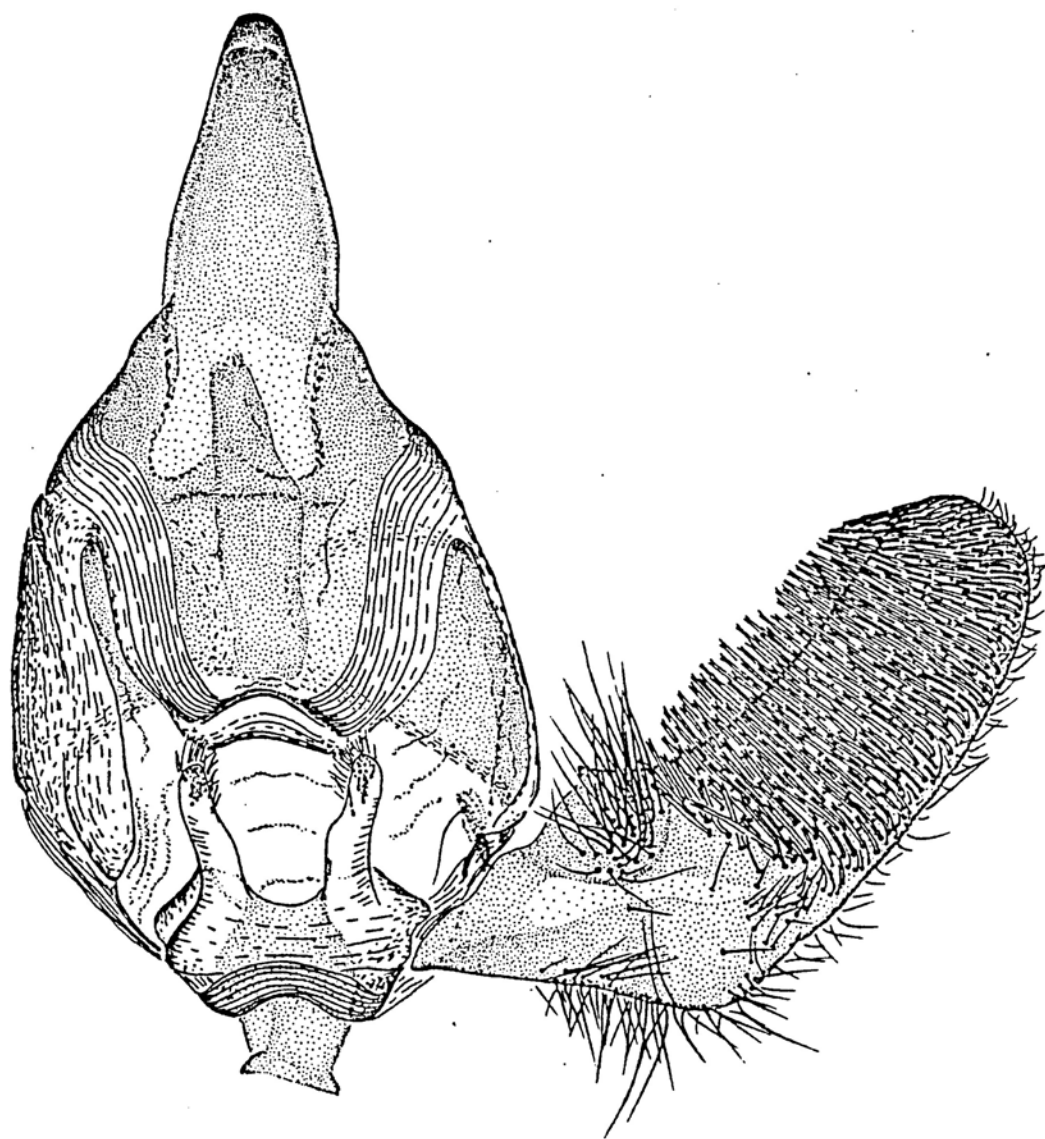
♂ 20-24mm, ♀ 26-28mm. Head whitish fuscous, frons edged with dark ochreous and fuscous scales; vertex and crown with fuscous scales, darker along middle. Second segment of labial palpi deep ochreous, dark grey above, whitish near outer articulation; third segment whitish with dark fuscous scales towards apex, slightly tinged with ochre above. Scape whitish, with fuscous-tipped scales above; flagellum fuscous, diffusely ringed with whitish scales on articulations; ciliation about diameter of flagellum. Thorax fuscous, dark brown along middle, scales whitish basally; tegulae slightly edged with ochreous scales; crest dark brown apically. Fore wings fuscous, scales whitish basally; costa deep ochreous to ferrugineous brown; termen, dorsum, oblique fasciae and fold ferrugineous brown; cilia fuscous, pale ochreous basally; underside dark golden-ochreous. Hind wings golden-ochreous, dorsum and cilia deep golden-ochreous. Legs deep golden-ochreous; fore tarsi whitish fuscous above, progressively darker distally. Abdomen deep golden-ochreous.

Genitalia ♂ (Fig. 29-31). Lateral margins of uncus parallel or with lateral margins narrowing slightly towards apex. Apex of gnathos variable, gradually to abruptly tapered. Juxta with digitate processes straight or with internal margins slightly sinuate. Lateral margins of valvae nearly parallel or valvae broader at base and strongly angled at one-third; apex evenly rounded. Aedeagus bent ventrad; vesica with several cornuti on dorsal side, several smaller acute spines ventrally.



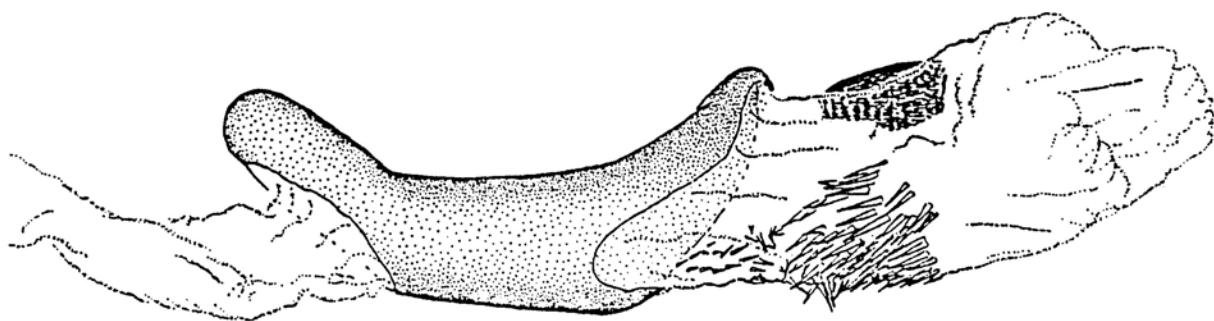
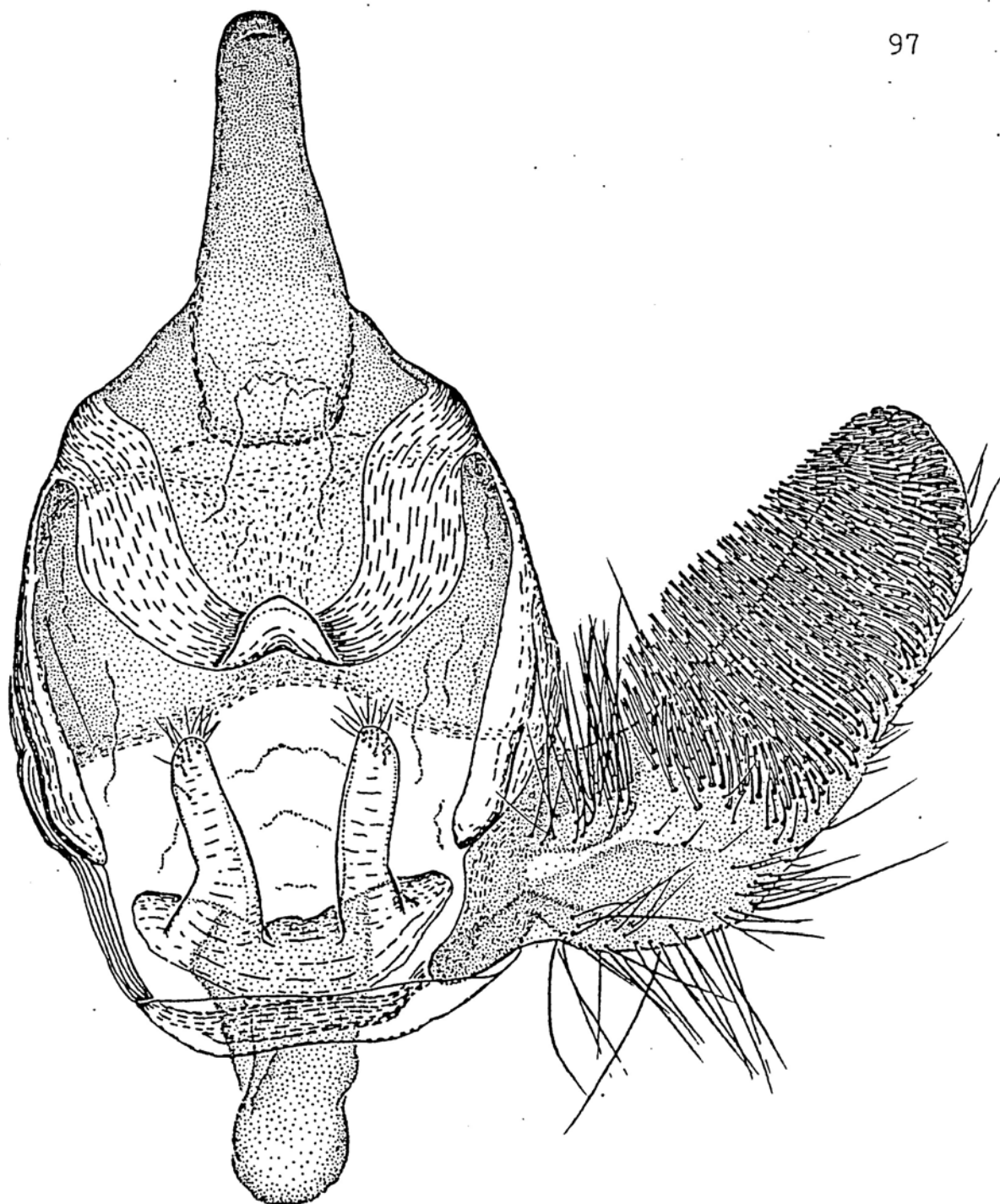
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Fig. 29 Genitalia of *Timocratica monotonia* (Strand), ♂, Colombia (slide no. 20991; BMNH).



V. J. 180

Fig. 30 Genitalia of Timocratica monotonia (Strand), ♂, Brazil (slide no. 20990; BMNH).



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Fig. 31 Genitalia of Timocratica monotonia (Strand),
♂, Venezuela (slide no. 20993).

Genitalia ♂ (Fig. 34). Ostium bursae wide, margin shallowly convex. Antrum conical, anterior part constricted, wrinkled longitudinally. Ductus bursae widening gradually towards corpus bursae. Corpus bursae pear-shaped, walls smooth as in ductus bursae. Signum a single elongate plate.

REMARKS. T. monotonia is very similar externally to pompeiana and meridionalis. The former is larger and has the basal half of the valvae very broad. The latter has a distinctive lighter area on the basal half of the fore wings and the coremata on the abdomen free, attached to the sternite surface.

Although there are no good external features to distinguish specimens from different localities, Meyrick described this species three times, giving no evidence as to why he believed they were different. The male genitalia exhibit slight differences between specimens from different places, but seem to be constant in specimens from the same locality. This is regarded as geographic variation as specimens from places between the type-localities have intermediate genitalia.

The type of monotonia has not been traced. According to Horn and Kahle (1936:191-270), Niepelt's collection was dispersed (sold to different collectors, as Niepelt was an insect-dealer), and the Strand types were deposited in the MNHU, Berlin and the IP, Eberswalde). Dr H.-J. Hannemann and Dr R. Gaedike, of these respective institutions, were unable to find the type (pers. comm.), and neither could it be traced at the BMNH where part of the Niepelt collection is now deposited.

According to Strand's figure monotonia can be associated with only three species: isographa, longicilia, and pompeiana. It is unlike that it represents either longicilia or pompeiana, as the former is known only from the high mountains of Colombia, and the latter (which could be a local form of isographa) from the type-locality in Southern Peru. The third species, with which the name T. isographa (with its synonyms crassa and claudescens) is widely distributed in the north of South America including Ecuador. In my opinion monotonia belongs to the same population and, is the senior name for this species.

BIOLOGY. Moths have been collected in April, May, June and July.

DISTRIBUTION (Fig. 35). Brazil (Amazonian Basin), British Guyana, Colombia, Ecuador, Peru, Venezuela.

Despite its wide geographic distribution, this species appears to be associated mainly with only two Life zones, Tropical Moist Forest and Tropical Premontane Wet Forest. The specimen from Palma Sola, Venezuela, which is in the Tropical Dry Forest, presumably is associated with the gallery forests extant in this savanna area.

MATERIAL EXAMINED.

21 ex. (18 ♂, 3 ♀; 8 ♂, 2 ♀ genitalia preparations).

Brazil: 8 ♂, Pará, Belém [Pará'] (Moss) (BMNH); 1 ♂, 1 ♀, Amazonas, Fonte Boa (Klages) (BMNH); Guyana: 1 ♂, Essequibo, Potaro, v.1908 (Klages) (BMNH); Colombia: 1 ♂, Cundinamarca, Medina (Fassl) (BMNH). Ecuador: 1 ♀,

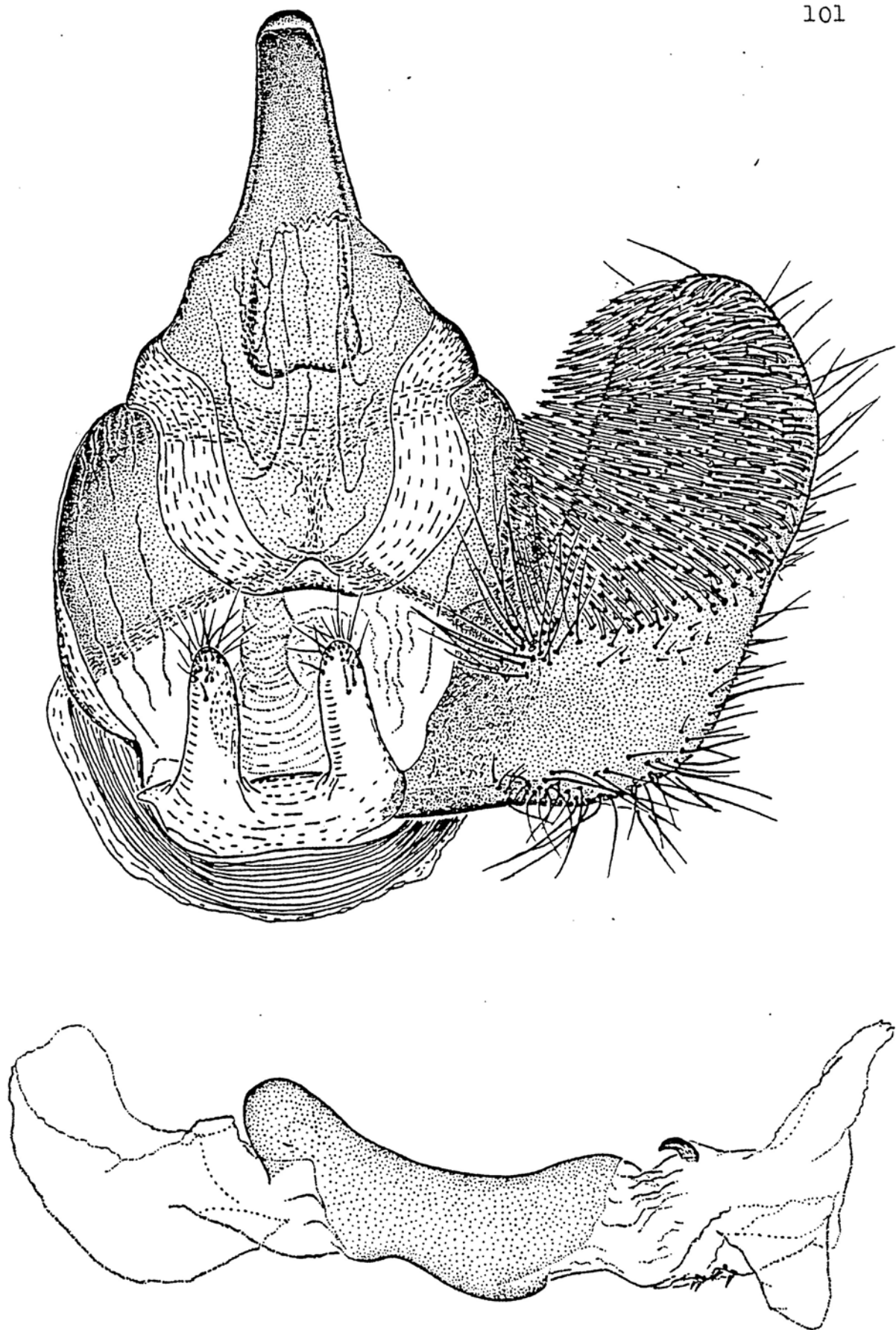
Pichincha, Santo Domingo de los Colorados, 14.ii.1959 (Hodges) (NMNH, Washington). Venezuela: 1 ♂, Aragua, Rancho Grande, 4.vi.1968 (Feige) (colln V. Becker, Brazil, no. 35016); 1 ♂, 1 ♀, Ibidem, 1100m, 10.iv, 10.v.1967 (Salcedo & Rodriguez) (colln V. Becker, Brazil, no. 39521); 1 ♂, Falcón, Palma Sola (BMNH); 2 ♂, Las Quinguas, near San Esteban (Klages) (BMNH); 1 ♂, San Esteban (Klages) (BMNH). Peru: 1 ♂, Puno, San Gabán [river], 760m ('2500 ft'), iv.1913 (NMNH, Washington) (paralectotype of claudescens Meyrick).

Timocratica meridionalis sp. n.

(Figs 11, 23, 32, 33, 35)

[Timocratica claudescens Meyrick; Biezanko, 1961b:6. Misidentification].

♂ 23-28mm. Head whitish, frons edged with ferrugineous, vertex and crown dark fuscous along middle. Second segment of labial palpi dark ochreous, whitish with fuscous scales above and around distal articulations; third segment whitish with fuscous scales below. Scape whitish fuscous above; flagellum whitish at base, progressively fuscous towards apex. Thorax light fuscous, ferrugineous brown along middle; crest dark brown apically; tegulae edged with ochreous scales. Fore wings light fuscous; basal half between R and costa whitish; costa ochreous to ferrugineous; apex, termen, tornus, and oblique fasciae ferrugineous brown; fold with ochreous scales; cilia



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Fig. 32 Genitalia of Timocratica meridionalis sp. n.,
paratype, Brazil (slide no. 513; colln
V. Becker, Brazil).

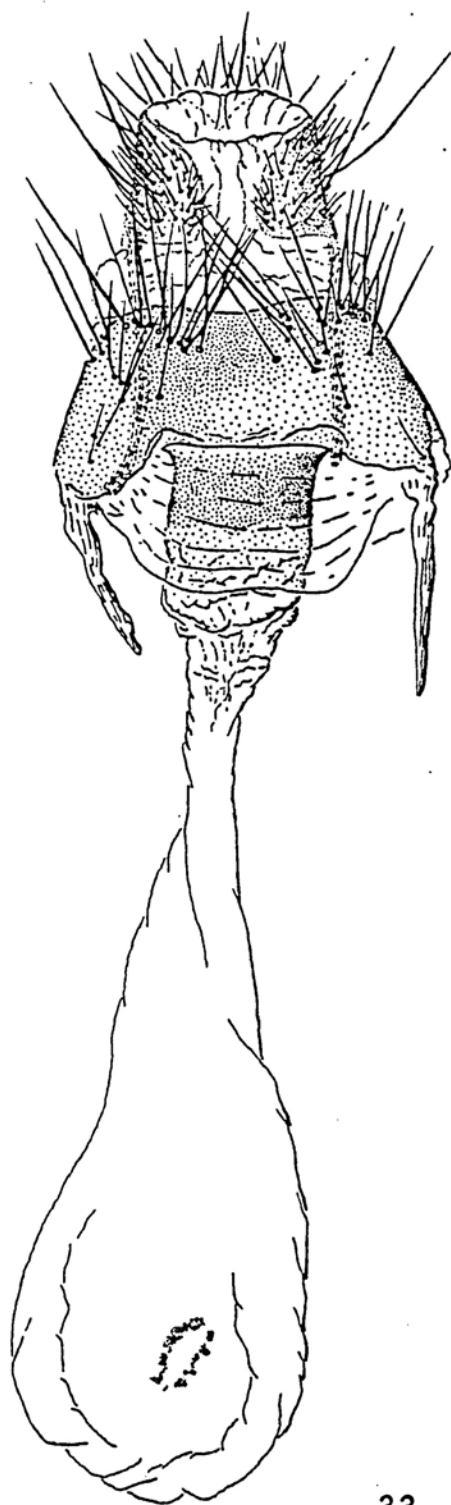
fuscous; underside dark ochreous. hind wings golden-ochreous, cilia and dorsum deep golden-ochreous. Legs deep golden-ochreous; fore tarsi whitish with grey scales above, progressively dark brown outwards; middle tarsi dark fuscous brown above; third to fifth segments of hind tarsi fuscous brown. Abdomen deep golden ochreous.

♀ 26-30mm. Lighter than male; second segment of labial palpi without grey scales above.

Genitalia ♂ (Fig.32). Uncus narrow, lateral margins progressively convergent towards apex; apex rounded. Apex of gnathos short, blunt. Digitate processes of juxta nearly straight, distal half dorsally and apex with several long setae. Valvae strongly curved near basal third, then with margins almost parallel; apex evenly rounded. Aedeagus bent ventrad, slightly narrower at middle; vesica with short, bent cornutus and few sharp-pointed, smaller spines.

Genitalia ♀ (fig.33). Margin of ostium bursae straight. Antrum with lateral margins almost parallel. Ductus bursae broadening progressively towards corpus bursae. Corpus bursae pear-shaped. signum a single plate, weakly sclerotized along middle.

REMARKS. T. meridionalis, the southern species in the group, is very similar to monotonia but can easily be distinguished by the lighter area on the basal half of the fore wings between R and costa, and by the genitalia. Although this species also has coremata on the second abdominal sternite,



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Fig. 33-34 Genitalia of Timocratica ♀. 33, T. meridionalis sp. n., paratype, Brazil (slide no. 21213; BMNH). 34, T. monotonia (Strand), Brazil (slide no. 21212; BMNH).

these are not housed in pockets but are free, attached to the sternite surface (Fig.11). This is probably an intermediate development between loxotoma and fraternella, which lack these coremata, and the remaining species of the genus, which have them housed in pockets (Fig.10).

It was impossible to examine the material studied by Biezanko (1961b:6) but, certainly it belongs to meridionalis not to claudescens which is a synonym of monotonia, a species ranging in the tropical areas of northern South America.

BIOLOGY. Moths have been collected in January to March and in October. Like palpalis, this species emerges earlier, in October, in the northern and warmer areas of its range, and later (February to March) in the southern areas. This seems to indicate that it is univoltine in the southern and colder areas, and further collections from the northern and warmer areas may show that it is bivoltine in these areas.

DISTRIBUTION (Fig.35). Southern Brazil, Paraguay and Bolivia. This species is the only representative of the monotonia species-group in the Warm Temperate and Subtropical regions of South America. It is restricted to two Life Zones, the Warm Temperate Moist Forest and to the Subtropical Lower Montane Moist Forest.

MATERIAL EXAMINED.

29 ex. (21 ♂, 8 ♀; 7 ♂, 2 ♀ genitalia preparations).

Holotype ♂, Brazil: Paraná, Curitiba, 920m, 12.iii.1975 (Becker, no. 16081) (MN, Rio de Janeiro).

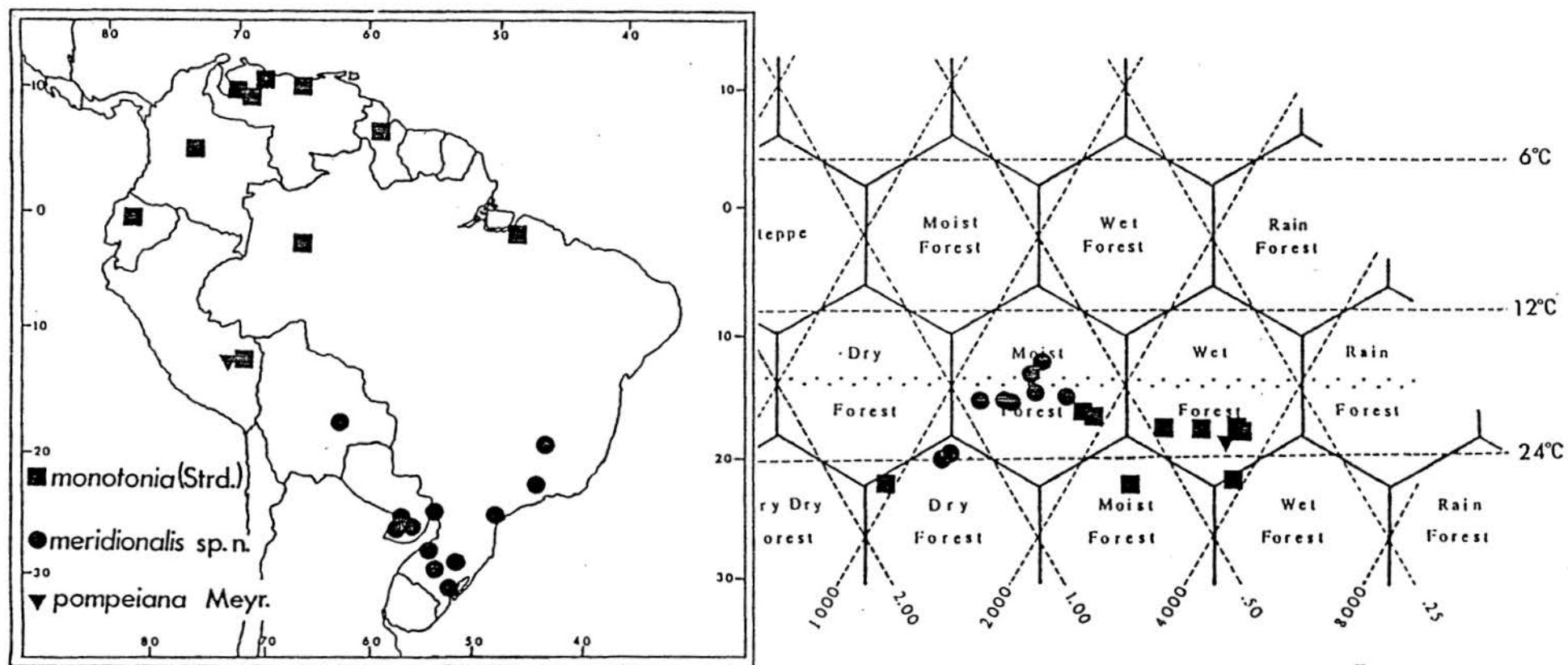


Fig. 35 Geographical and ecological distribution of the *monotonia*-group of *Timocratica*.

Paratypes. Brazil: 1 ♂, 1 ♀, Minas Gerais, Sete Lagoas, 720m 18-20.x.1969 (Becker) (colln V. Becker, Brazil, nos 39-40); 1 ♂, São Paulo, Ipiranga, iii.1926 (Spitz) (BMNH); 1 ♀, São Paulo, São Bernardo, iii.1926 (Spitz) (BMNH); 2 ♂, 1 ♀, São Paulo, Piracicaba, 14-19.i.1966 (ESALQ, Piracicaba); 9 ♂, 4 ♀, Paraná, Curitiba, 920m, 15.ii-20.iii.1975 (Becker, nos 16078-16083) (colln V. Becker, Brazil; BMNH; NMNH, Washington; MNHU, Berlin; NM, Vienna); 1 ♂, 1 ♀, Paraná, Iguaçu, 20.ii-5.iii.1922 (BMNH); 1 ♂, Rio Grande do Sul, Elsenau, 1905 (Martin) (BMNH); 1 ♂, Rio Grande do Sul, Santa Maria, 25.iii.1971 (Link) (colln V. Becker, Brazil, no. 30192); 1 ♂, Rio Grande do Sul, Pelotas, 14.ii.1961 (Biezanko) (colln V. Becker, Brazil, no. 30191). Bolivia: 1 ♀, Santa Cruz, Prov. del Sara, 450m (Steinbach) (BMNH). Paraguay: 1 ♀, Irapá, 20.x.1924 (BMNH); 1 ♂, Sapucay, 20.i.1905 (Forster) (BMNH); 1 ♂, Villa Rica (Jørgensen)(NMNH, Washington).

Excluded from type-series. 1 ♂, [South Africa]: Natal, Stellenbosch (C.K.B.) (BMNH) [mislabelled].

Timocratica loxotoma (Busck)

(Figs 12, 36, 38, 40, 42)

Stenoma loxotoma Busck, 1910, Proc. ent. Soc. Wash. 11:212.

Holotype ♂, MEXICO: Vera Cruz, Orizaba, vi (Müller)

(NMNH, Washington, no. 12809) [not examined].

Stenoma loxotoma Busck; Walsingham, 1913:179 [list].

Timocratica loxotoma (Busck); Busck, 1935:17 [catalogue].

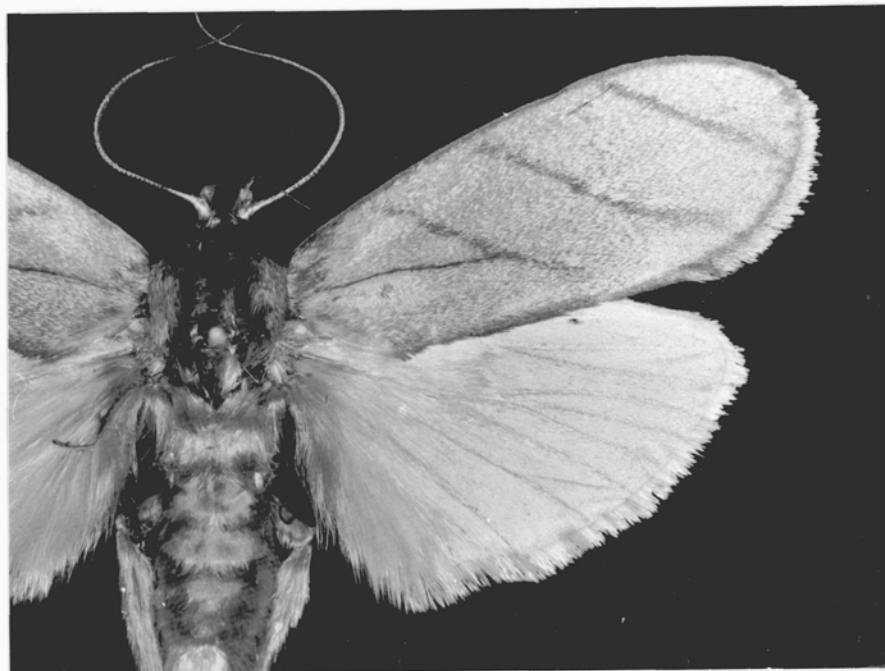


Fig. 36 Timocratica loxotoma (Busck), ♂, Mexico (BMNH).



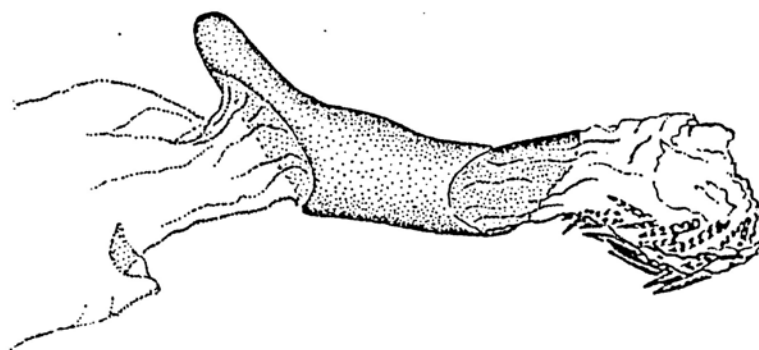
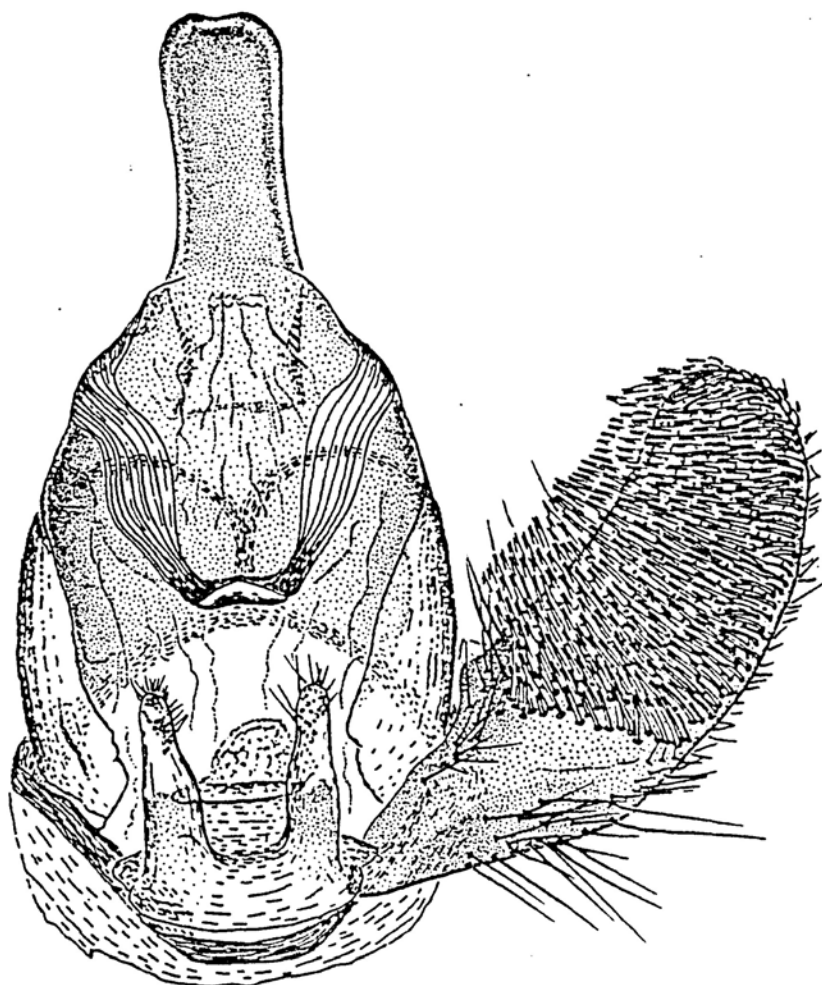
Fig. 37 Timocratica species 1, ♀, Costa Rica
(colln V. Becker, Brazil, no. 24273).

♂ 20-22mm. Head whitish, frons edged with fuscous, vertex and crown with fuscous scales along middle. Second segment of labial palpi deep ochreous below, dark fuscous above, pale distally, third segment pale fuscous. Antennae whitish fuscous. Thorax fuscous above, dark fuscous along middle, apical half of crest scales dark fuscous-brown. Fore wings light fuscous; costa, apex, termen, dorsum, oblique fasciae and fold ferruginous brown; cilia fuscous. Hind wings and underside of fore wings golden-ochreous. Legs deep golden-ochreous; fore tarsi light fuscous above, dark fuscous on claws, middle tarsi progressively dark fuscous towards claws. Abdomen deep golden-ochreous above, paler below.

♀ 22-28mm. Slightly paler than male. Second segment of labial palpi without fuscous tinge above.

Genitalia ♂ (Fig.38). Margins of uncus nearly parallel, apex slightly concave. Digitate expansions of juxta nearly straight, with few setae apically. Margins of valvae nearly parallel. Aedeagus bent ventrad, vesica with several long spines dorsally.

Genitalia ♀ (Fig.40). Margin of ostium bursae expanded posteriorly, concave medially. Antrum slightly constricted at middle, with longitudinal wrinkles anteriorly. Ductus bursae broadening progressively towards corpus bursae. Corpus bursae globular, walls smooth. Signum an elongate plate weakly sclerotized at middle.



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Fig. 38 Genitalia of Timocratica loxotoma (Busck), ♂, Mexico (slide no. 508; colln V. Becker, Brazil).

REMARKS. Although this Central American species is very similar to monotonia externally, it can easily be distinguished in the male as it lacks the pair of coremata on the second abdominal sternite. The female can be distinguished by the shape of the margin of the ostium bursae and by the wide, globular corpus bursae.

BIOLOGY. Moths have been collected in April, June, August, September and December.

DISTRIBUTION (Fig.42). Mexico¹ (Gulf of Mexico and Yucatán Peninsula), Guatemala and Costa Rica. This species is associated with a wide range of Life Zones and has been collected from the Tropical Dry Forest and the Tropical Moist Forest, up to the Tropical Premontane Wet Forest.

MATERIAL EXAMINED.

18 ex. (13 ♂, 5 ♀; 3 ♂, 2 ♀ genitalia preparations).

Mexico: Veracruz, veracruz (Schwarz) (paratype ♂); 3 ♂, Veracruz, Huatuxco (BMNH); 3 ♂, Campeche, Escarcega, 30.ix.1973 (Becker) (colln V. Becker, Brazil, no. 25601); 1 ♂, San Luiz Potosi, Palitla, 5.viii.1966 (Flint) (NMNH, Washington); 1 ♂, San Luiz Potosi, Tamazunchale, 26.vi.1965 (Flint) (NMNH, Washington). Guatemala: 1 ♂, Chejel, vi (Schaus) (NMNH, Washington); 1 ♂, Petén, Tikal, 19-22.ix.1973 (Becker) (colln V. Becker, Brazil, no. 25582). Costa Rica: 3 ♀, Cartago, Turrialba, 10.ix.1971, 10.x.1971, 10.xii.1971 (Becker) (colln V. Becker, Brazil, nos 24591, 24710, 24843); 1 ♀, Ibidem, 10.vi.1972 (Becker, no. 24913) (BMNH).

Timocratica species 1

(Figs 37, 39, 42)

♀ 23-24mm. similar to loxotoma and monotonia. hind wings yellowish-fuscos. Abdomen golden-ochreous.

Genitalia ♀ (Fig.39). Margin of ostium bursae rounded, expanded posteriorly. Antrum slightly constricted posteriorly, anterior half wrinkled longitudinally. ductus bursae constricted posteriorly, widening progressively towards corpus bursae, wrinkled longitudinally. Corpus bursae globular. signum a nearly circular, diffuse plate.

REMARKS. The two females considered here are very similar to loxotoma and monotonia but their hind wings are yellowish-fuscos, not golden-ochreous. The genitalia are very close to those of loxotoma but the margin of the ostium bursae is evenly rounded, whereas it is concave in loxotoma. Their yellowish-fuscos hind wings suggest some relationship with fraternella, and they could well represent the female of that species, but as they are very much lighter, and in poor conditions, it seems better not to name them until more material is available for study.

BIOLOGY. Moths have been collected in July and October.

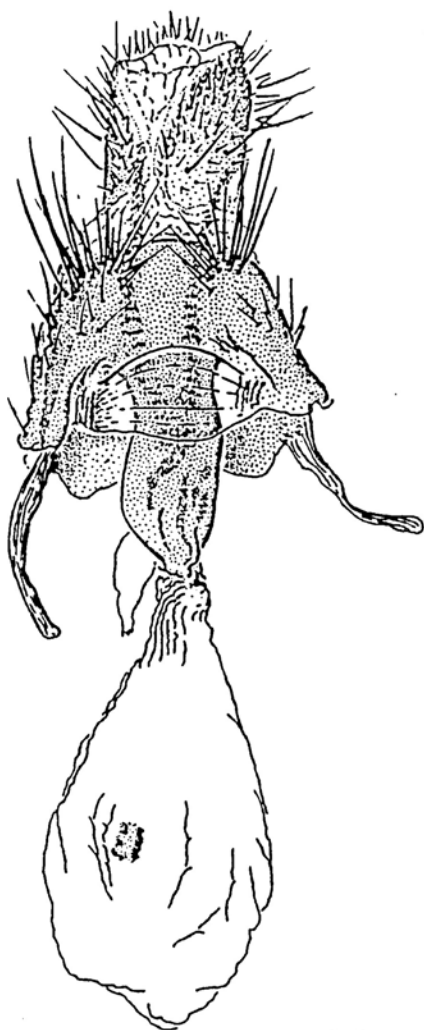
DISTRIBUTION (Fig.42). Costa Rica (known only from Turrialba). This form occurs in the Life Zone with fraternella, the Tropical Premontane Wet Forest.

MATERIAL EXAMINED.

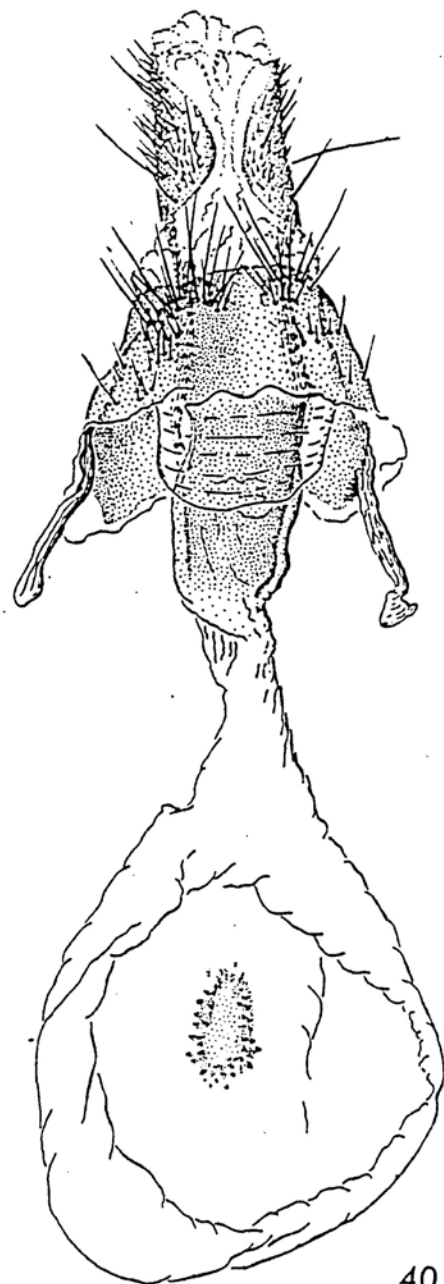
2 ♀ (2 ♀ genitalia preparations)

Costa Rica: 2 ♀, Cartago, Turrialba, 600m, 15.vii, 20.x.

1972 (Becker, nos 24273, 25170) (colln V. Becker, Brazil;BMNH)



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Figs 39-40 Genitalia of Timocratica ♀. 39, T. species 1, Costa Rica (slide 511; colln V. Becker; Brazil). 40, T. loxotoma (Busck), Mexico (slide no. 21035; BMNH).

Timocratica fraternella (Busck)

(Figs 41-43)

Stenoma fraternella Busck, 1910, Proc. ent. Soc. Wash. 12:

80. Holotype ♂, COSTA RICA: Cartago, Juan Viñas (Shaus)
(NMNH, Washington, no. 13203) [not examined].

Stenoma fraternella Busck; Walsingham, 1913:179 [list].

Timocratica fraternella (Busck); Busck, 1935:16 [catalogue].

♂ 14-19mm. Head whitish, frons edged with fuscous; crown with fuscous scales along middle. Palpi bright fuscous, second segment dark fuscous above, third segment progressively dark fuscous towards apex. Antennae fuscous, scape whitish. Thorax fuscous, apex of crest scales dark brownish-fuscous, metascutum and first abdominal tergite yellowish-fuscous. Wings dark shiny fuscous, costa edged with deep ochre; termen, dorsum, as well as oblique fasciae and fold of fore wings, dark brownish-fuscous. Legs deep golden-ochreous; fore tarsi light fuscous above, dark fuscous distally; middle tarsi dark fuscous above; hind claws dark fuscous. Abdomen deep golden-ochreous; tergites crossed with dark fuscous bands near articulations.



Fig. 41 Genitalia of Timocratica fraternella (Busck), ♂, Costa Rica (slide no. 506; colln V. Becker, Brazil).

Genitalia ♂ (Fig.41). Uncus slightly dilatated medially. Apex of gnathos short, blunt. Digitate processes of juxta straight, gently narrowed at middle; dorsal side of apex with several short setae. Valvae with margins nearly paralell, ventral margin evenly rounded at basal third. Aedeagus with basal third strongly curved ventrad; vesica with several spines on dorsal side, progressively longer distally.

REMARKS. T. fraternella is easily separated from any other species in this group by its dark fuscous hind wings, and from parvifusca by its oblique fasciae on the fore wings. The male genitalia are very similar to those of loxotoma and as in that species, lacks the pair of coremata on the second abdominal sternite.

BIOLOGY. Moths have been collected in May and November.

DISTRIBUTION (Fig.42). Costa Rica. Known only from the type-locality, Juan Viñas, and Turrialba, about 20 km distant. Both localities are in the Tropical Premontane wet Forest.

MATERIAL EXAMINED:

5 ♂ (2 ♂ genitalia preparations).

Costa Rica: 1 ♂, 1910 (Lankaster) (BMNH); Cartago, Juan Viñas (Schaus) (BMNH) (paratype ♂); 2 ♂, Cartago, Turrialba, 10.xi.1971 (Becker) (colln V. Becker, Brazil, no. 24789); 1 ♂, Ibidem, 10.v.1973 (Becker) (colln V. Becker, Brazil, no. 25446).

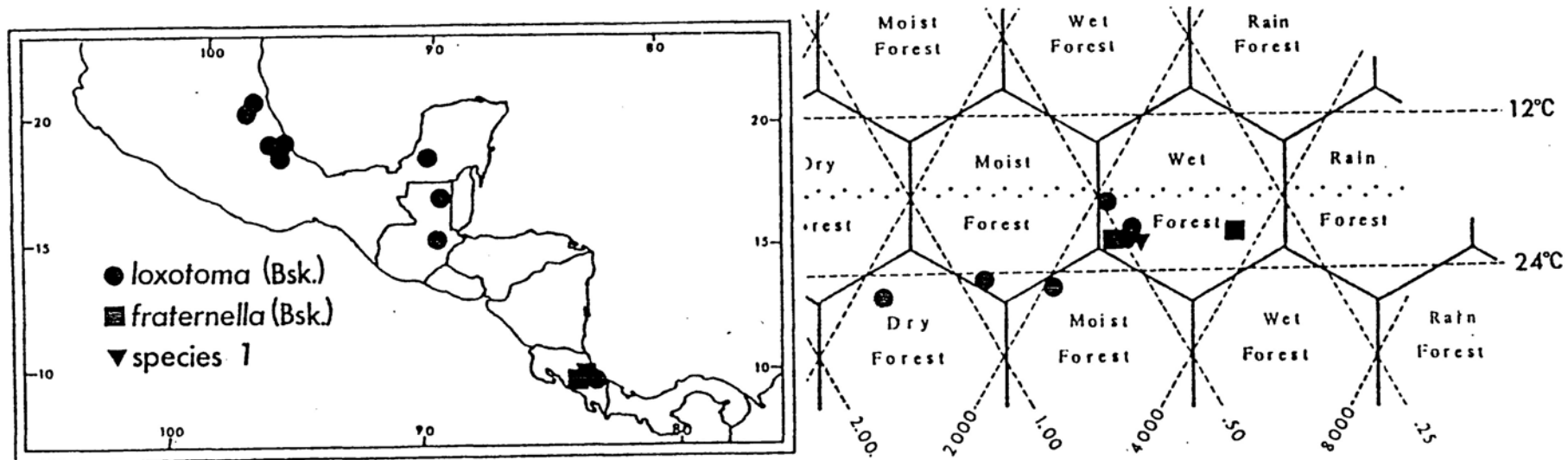


Fig. 42 Geographical and ecological distribution of the monotonia-group of Timocratica.

The leucocapna-group

♂, ♀, 18-26mm. Head whitish, vertex with fuscous or brownish scales. Third segment of labial palpi one-third length of second, nearly straight. Thorax without crest of long scales, covered with fuscous and whitish scales. Fore wings elongate; basal half of costa nearly straight, distal half evenly rounded, apex acutely angled; veins free; dark fuscous, basal half with yellow scales between Rs and costa, diffuse whitish area crossed with dark fuscous veins beyond cell. Hind wings golden-yellow. Abdomen golden-yellow with dark fuscous scales on tergites in some specimens; coremata bound in pockets.

Genitalia ♂ (Fig.). Digitate processes of juxta not reaching anterior margin of gnathos apex.

REMARKS. This group can easily be distinguished from the monotonia-group and parvifusca by the free veins of the fore wings, and from the albella-group by the dark fuscous fore wings.



Fig. 43 Timocratica fraternella (Busck), ♂, Costa Rica (colln v. Becker, Brazil, no. 24789).

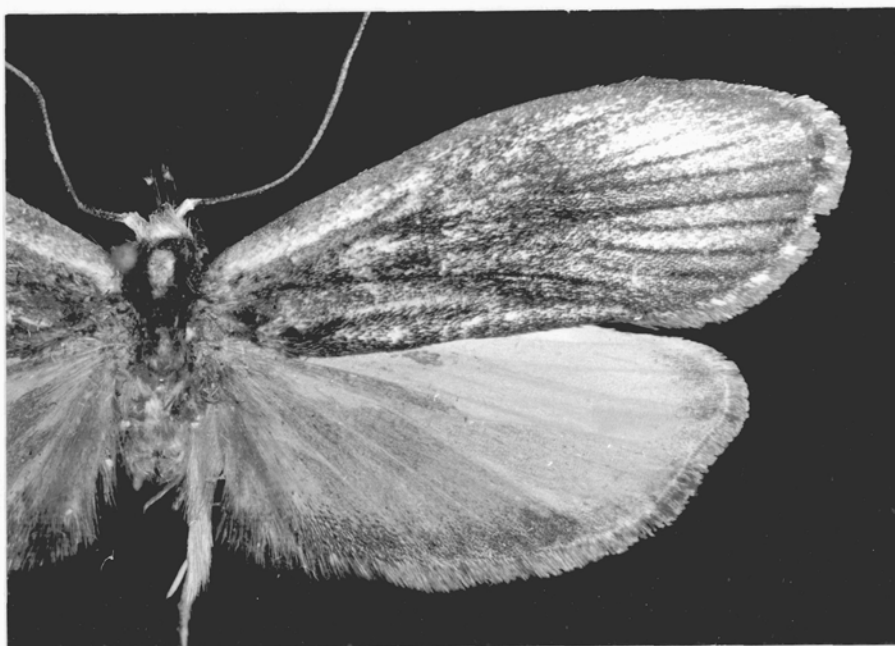
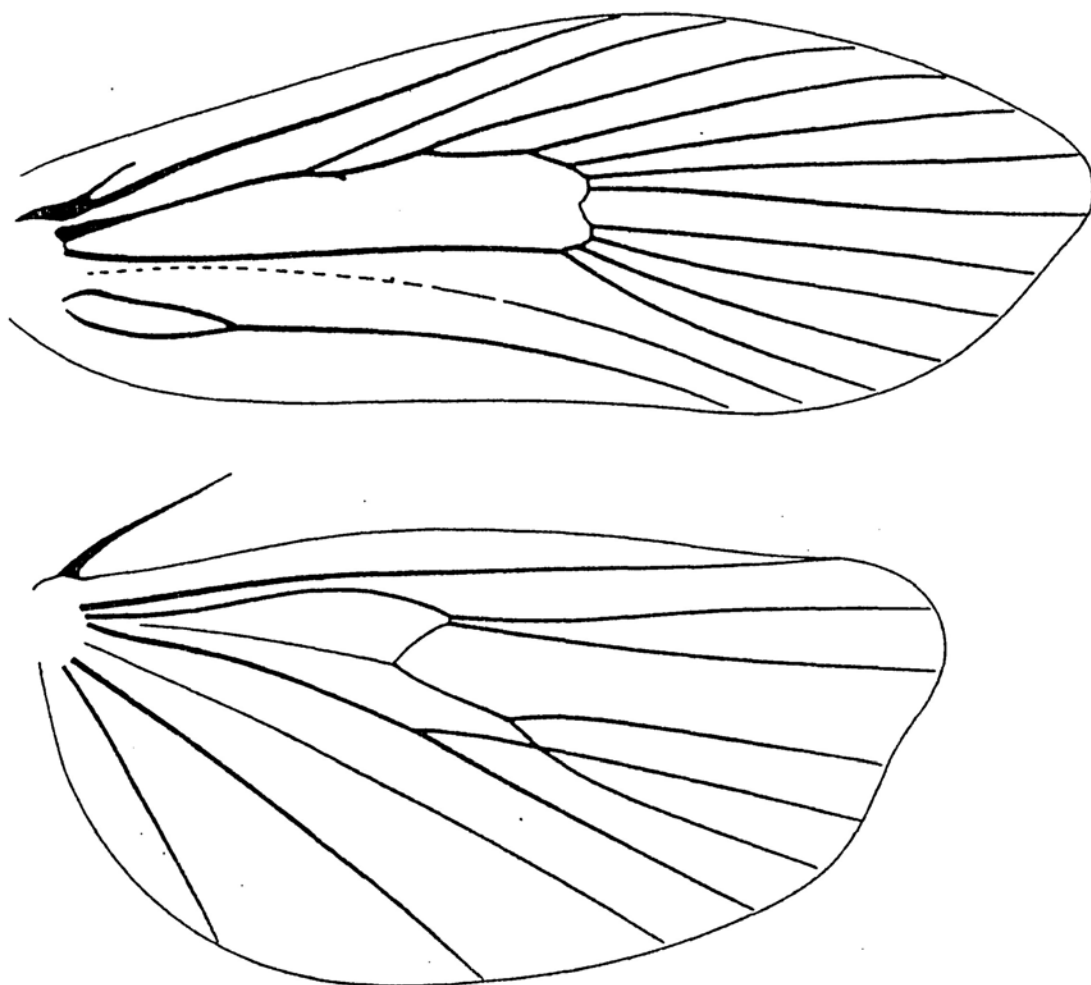


Fig. 44 Timocratica effluxa (Meyrick), ♂, holotype Bolivia (BMNH).



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Fig. 45 wing venation of Timocratica leucocapna
(Meyrick).

Timocratica leucocapna (Meyrick) comb. rev.

(Figs 5, 8, 45-47, 50, 51)

Lychnocrates leucocapna Meyrick, 1926, Exot. Microlepidopt.

3:227. Holotype ♂, COLOMBIA: Cundinamarca, Medina, 500m ('1650 ft'), (genitalia slide 4964, Clarke; BMNH) [examined].

Timocratica leucocapna (Meyrick); Busck, 1935:17 [catalogue].

Lychnocrates leucocapna Meyrick; Clarke, 1955:224; pl. 112, figs 1-1d [adult, wing venation, genitalia].

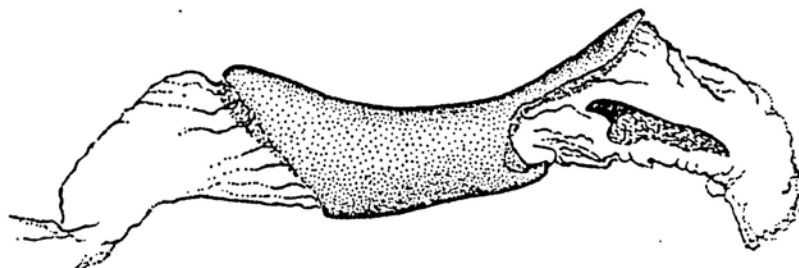
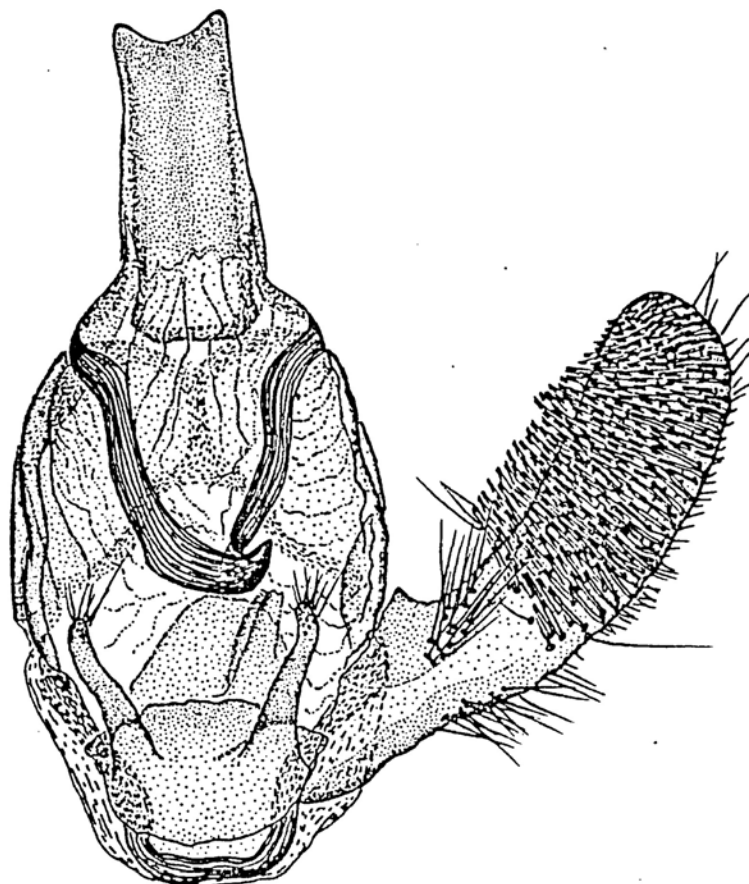
♂ 18-22mm, ♀ 26mm. Head whitish, frons light ochreous, progressively deep ochreous towards clypeus, vertex suffused with fuscous. Haustellum covered with white scales at base. Second segment of labial palpi ochreous, slightly tinged with fuscous below near distal articulations, white dorsally; third segment white, dark fuscous below. Antennae with scape whitish, slightly tinged with ochreous, flagellum basally white, basal half ochreous suffused with fuscous, then progressively ochreous towards apex. Thorax whitish, suffused with fuscous; patagia whitish; tegulae light fuscous. Fore wings dark fuscous, basal half between Rs and costa ochreous with white scales; a large, diffuse, whitish area beyond cell; crossed with dark fuscous veins; cilia dark fuscous with white dots near veins; underside ochreous. Hind wings light to golden-ochreous. Legs ochreous, fore tibiae and tarsi dark fuscous with white scales on articulations, middle and hind tarsi above with dark fuscous scales. Abdomen ochreous, some specimens with third to sixth tergites dark fuscous.

Genitalia ♂ (Fig. 46). Uncus with lateral margins nearly parallel, posterior margin concave, slightly broadened in some specimens. Apex of gnathos pointed, bent posteriorly. Digitate processes of juxta straight or bent gently inwards near apex, apex with several setae. Valvae with margins nearly parallel or somewhat broadened at middle. Aedeagus bent ventrad; vesica with two cornuti, a strong one and another smaller, on the opposite side.

Genitalia ♀ (Fig. 51). Ventral margin of ostium bursae expanded posteriorly, falcate at middle. Antrum slightly constricted anteriorly. Ductus bursae twisted posteriorly, nearly cylindrical, broadening progressively towards corpus bursae. Corpus bursae nearly globular. Signum a single irregular plate.

REMARKS. T. leucocapna is easily distinguished from effluxa by the absence of fuscous on the hind wing margins. The specimen from Turrialba, Costa Rica, have the abdomen plain golden-ochreous; some have the hind wings deep golden-ochreous.

BIOLOGY. Moths have been collected in January to June and September.



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Fig. 46 genitalia of Timocratica leucocapna (Meyrick), ♂, Costa Rica (slide no. 503; colln V. Becker, Brazil).

DISTRIBUTION (Fig. 50). Costa Rica, Colombia, Peru and Venezuela. Despite its wide geographical distribution this species appears to be confined to a single Life Zone, the Tropical Premontane Wet Forest.

MATERIAL EXAMINED.

16 ex. (15 ♂, 1 ♀; 4 ♂, 1 ♀ genitalia preparations).

Costa Rica: 1 ♂, 1 ♀, Cartago, Tuerialba, 600m, 17-22. ii.1965 (Duckworth) (NMNH, Washington); 5 ♂, Ibidem, 15.vii, 10.ix.1971, 10.iv.1972 (Becker, nos 24268, 24592, 24924, 24973) (colln V. Becker, Brazil; BMNH). Colombia: 2 ♂, Cundinamarca, Medina (Fassl) (BMNH). Peru: 3 ♂, La Oroya, R. Inambari, 1000m ('3100 ft'), iii, xi-xii.1906 (Ockenden) (BMNH). Venezuela: 2 ♂, Barinas, La Chimenea, 5 km South La Soledad, 1500m, 28-29.v.1975 (Dietz) (colln V. Becker, Brazil, no. 39522; UCV, Venezuela); 1 ♂, Lara, Anzoategui, Quebrada Guacó, 1440m, 13-16.vi.1972 (Salcedo & Zambrano) (UCV, Venezuela).



Fig. 47 Timocratica leucocapna (Meyrick), ♂, holotype
Colombia (BMNH).

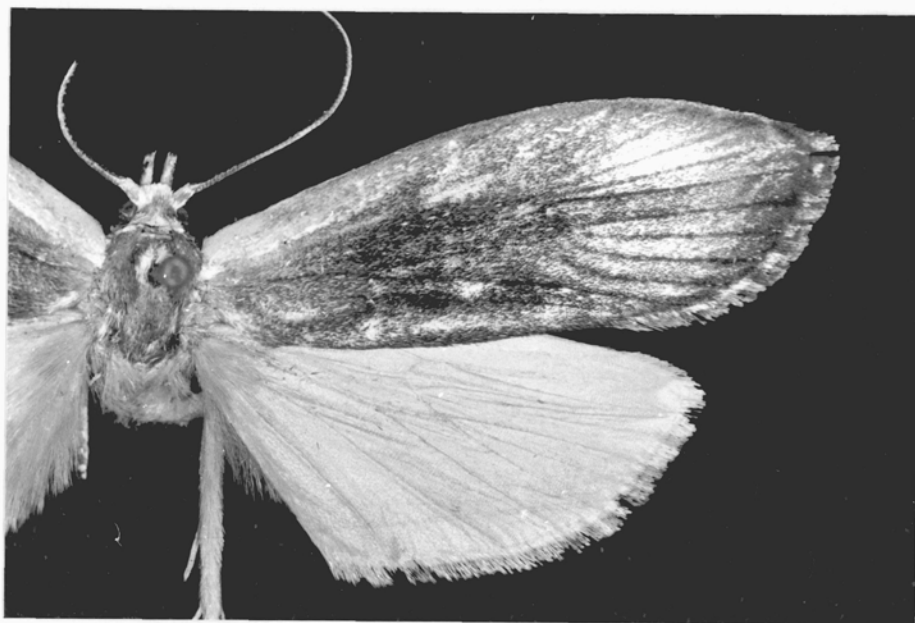


Fig. 48 Timocratica species 2, ♂, Peru (BMNH).

Timocratica species 2

(Figs 48, 50)

♂ 26mm. Similar to leucocapna. Fore wings with the achreous area on the basal half less pronounced; area beyond cell darker.

Genitalia ♂. Similar to those of leucocapna.

REMARKS. The only specimen representing this form was collected in the same locality as three specimens of typical leucocapna. It is larger than any other male of the series representing leucocapna and quite distinctive, but its genitalia are almost identical. As in effluxa, more material is necessary to clarify this form.

BIOLOGY. The only specimen known was collected in March.

DISTRIBUTION (Fig. 50). Peru (Eastern slopes of the Andes). The only specimen was collected in the Tropical Premontane Wet Forest, a Life Zone where leucocapna also occurs.

MATERIAL EXAMINED.

Peru: 1 ♂, Puno, La Oroya, Rio Inambari, 1000m ('3100ft'), iii.1905 (Ockenden) (BMNH).

Timocratica effluxa (Meyrick)

(Figs 44, 49, 50)

Lychnocrates effluxa Meyrick, 1930, Exot. Microlepidopt.

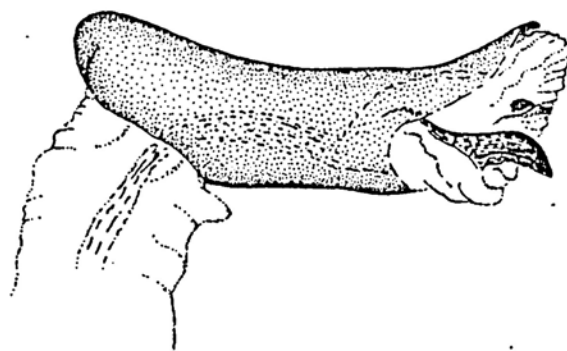
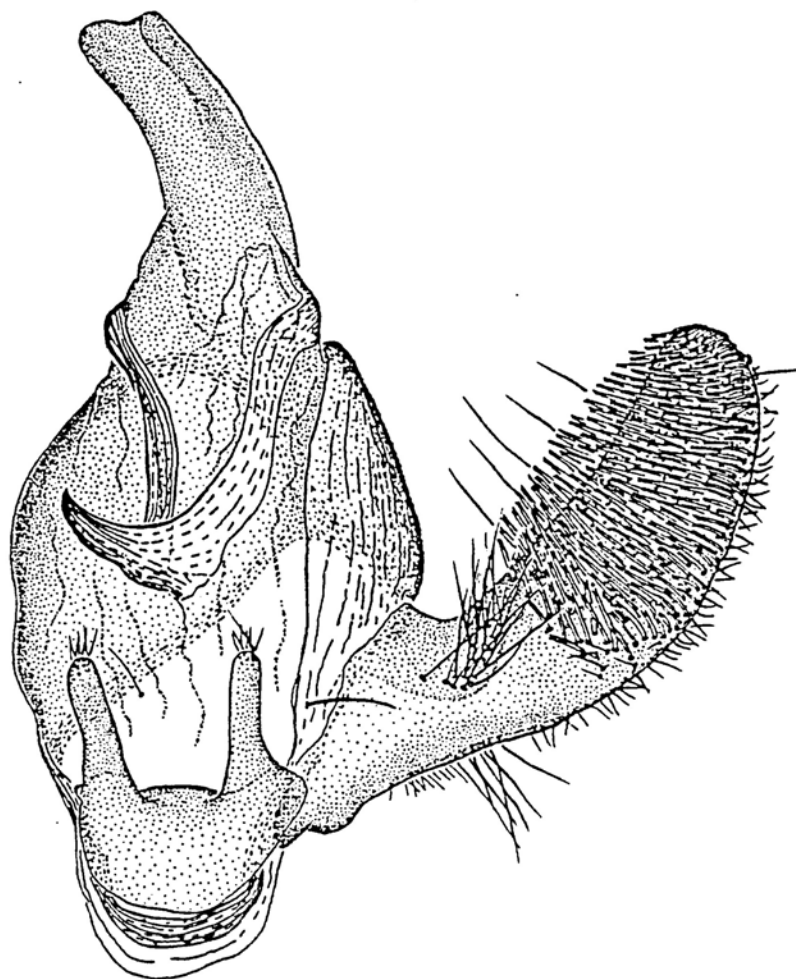
4:19. Holotype ♂, BOLIVIA: La Paz, Rio Songo, 750m

(Fassl) (genitalia slide 5616, Clarke; BMNH) [examined].Timocratica effluxa (Meyrick); Busck, 1935:16 [catalogue];

Clarke, 1955:388; pl. 194, figs 2-2b [adult, genitalia]:

♂ 20mm. Head whitish, tinged with light ochreous; vertex with long brownish-fuscous scales. Second segment of labial palpi ochreous, dark fuscous above; third segment white basally, with dark fuscous scales towards apex. Antennae fuscous, scape with white scales, distal half of flagellum with ochreous scales. Thorax fuscous, with white scales. Fore wings dark fuscous, veins darker than ground colour, sparsely mixed with white scales; white streak poorly defined at base, between Rs and Sc; a diffuse white area crossed with fuscous veins beyond cell, not reaching margins; cilia dark fuscous with white spots near veins; underside ochreous, distal one-quarter fuscous. Hind wings ochreous, termen and dorsum fuscous; cilia fuscous. Legs ochreous, fore tarsi dark fuscous, middle and hind tarsi with dark fuscous scales.

Genitalia ♂ (Fig. 49). Similar to leucocapna.



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Fig. 49 Genitalia of *Timocratica eifluxa* (Meyrick), ♂, holotype, Bolivia (slide no. 5616, Clarke; BMNH).

REMARKS. T. effluxa is easily recognized among others in this genus by the fuscous borders of its hind wings. Although its genitalia are almost identical to those of leucocapna it seems to be a good species. The colour pattern of the wings in leucocapna shows little variation, the hind wings are plain golden-ochreous and the fore wings have a distinctive ochreous area on the basal half between Rs and the costa. All these features are absent in effluxa.

BIOLOGY. Unknown.

DISTRIBUTION (Fig.50). Bolivia. The type-locality belongs to the Subtropical Moist Forest.

MATERIAL EXAMINED.

Known only from the holotype.

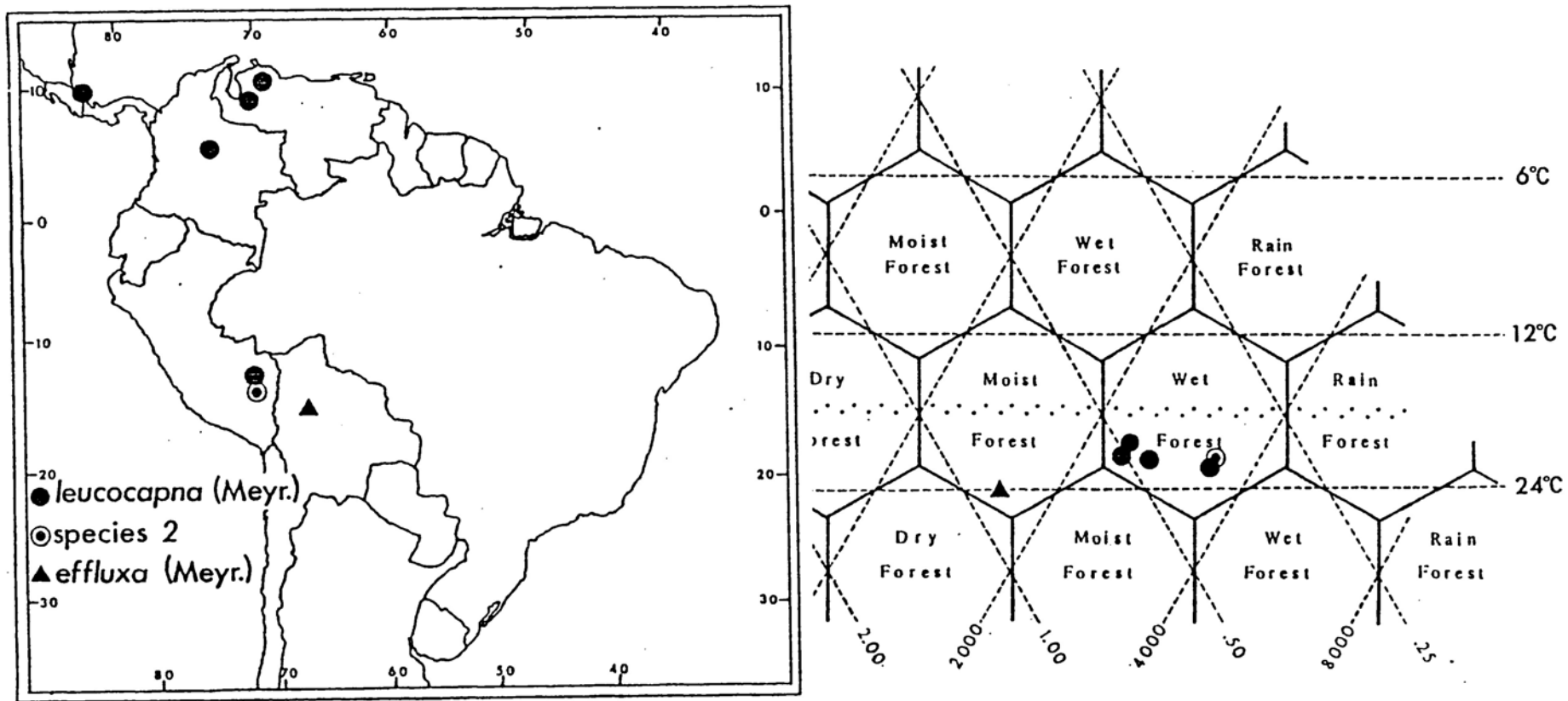
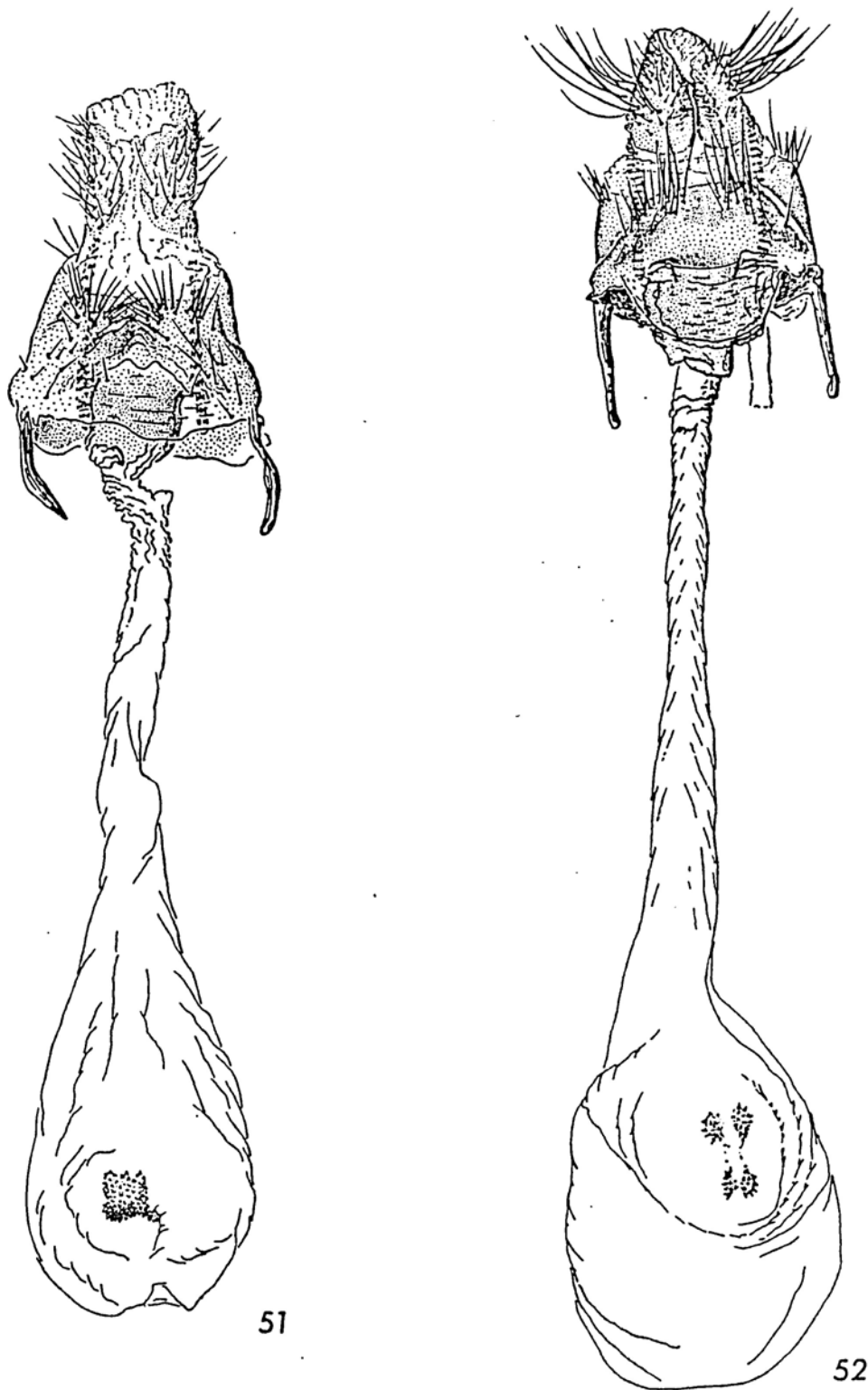


Fig. 50 Geographical and ecological distribution of the *leucocapna*-group of *Timocratica*.



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Figs 51-52 Genitalia of *Timocratica* ♀. 51, *T. leucocapna* (Meyrick), Costa Rica (slide, Becker; NMNH, Washington). 52, *T. grandis* (Perty), French Guiana (slide no. 21015; BMNH).

The albella-group

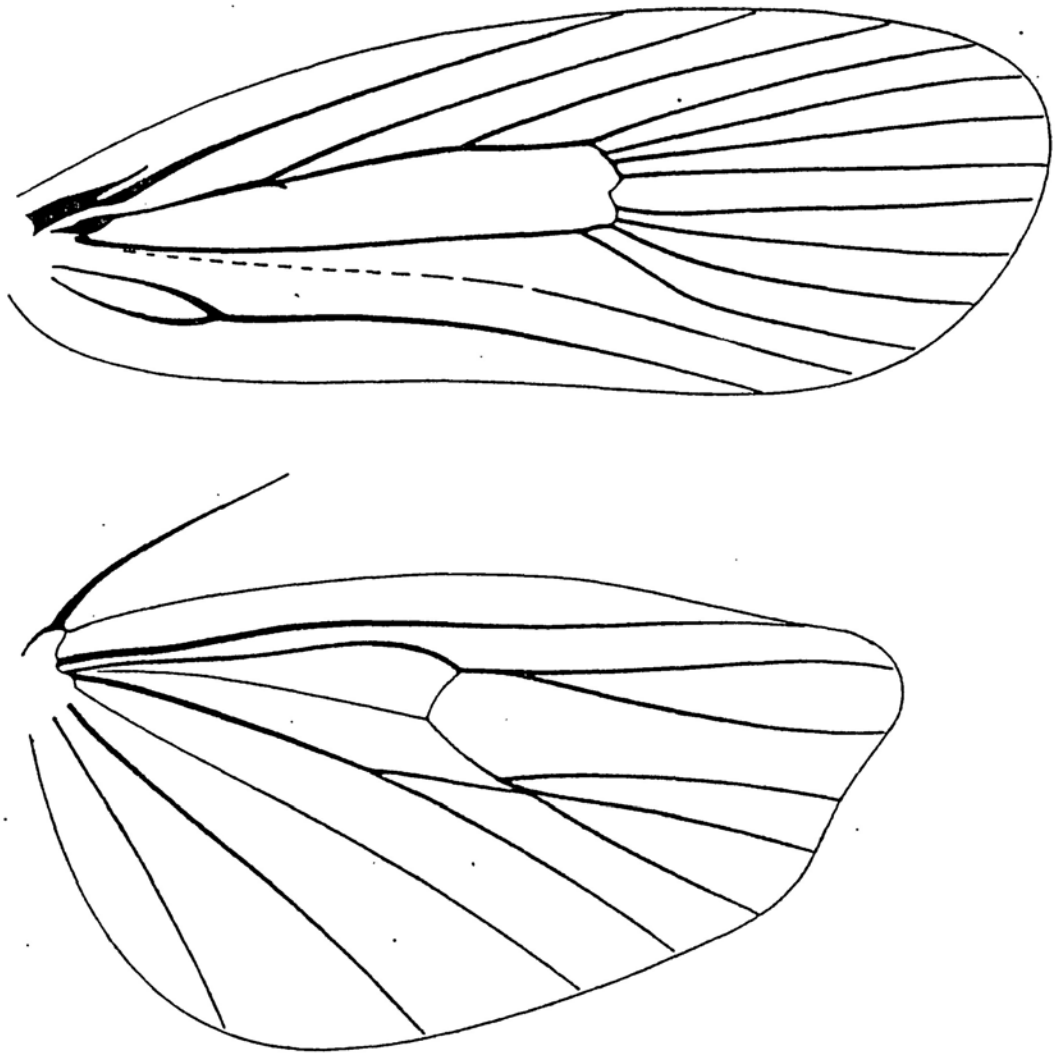
♂, ♀, 9-32mm. Head, thorax and ground-colour of fore wings white. Third segment of labial palpi half to same length as second. Thorax without crest of scales. Fore wings elongate, subrectangular or suboval; veins free, or CuA_1 and CuA_2 , and R_4 and R_5 , or both, stalked; plain white above except for melanostriga; white below, tinged with golden-yellow, and/or fuscous along apex and termen. Hind wings white, golden-yellow or tinged with yellow. Abdomen white below; golden-ochreous, tinged with golden-yellow or white above; coremata bound in pockets. In parvifusca the wings are almost fuscous.

Genitalia ♂. Digitate processes of juxta often reaching anterior margin of gnathos apex.

REMARKS. The species of this group can easily be recognized by the white ground-colour of the fore wings. T. parvifusca is the only fuscous species in this group but, is easily separated from other fuscous species by the stalked R_4 and R_5 of the fore wings.

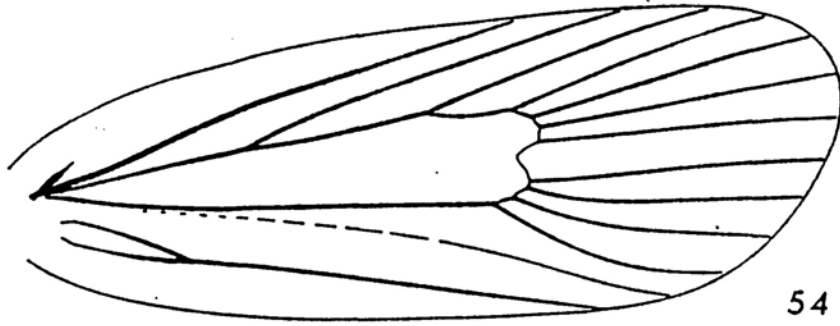
The grandis-complex

Hind wings and abdomen golden-yellow or golden-ochreous.

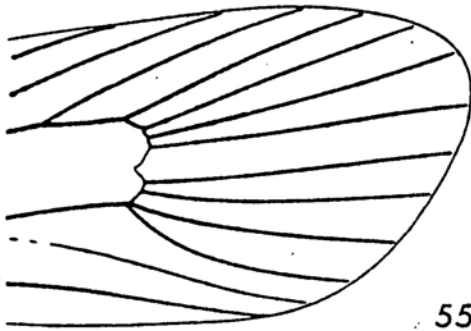


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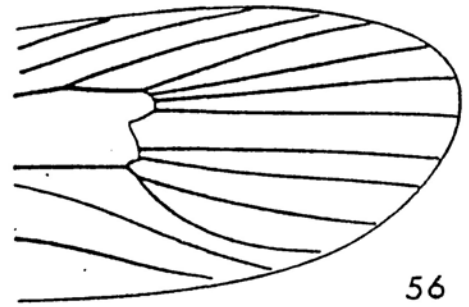
Fig. 53 Wing venation of Timocratica palpalis (Zeller).



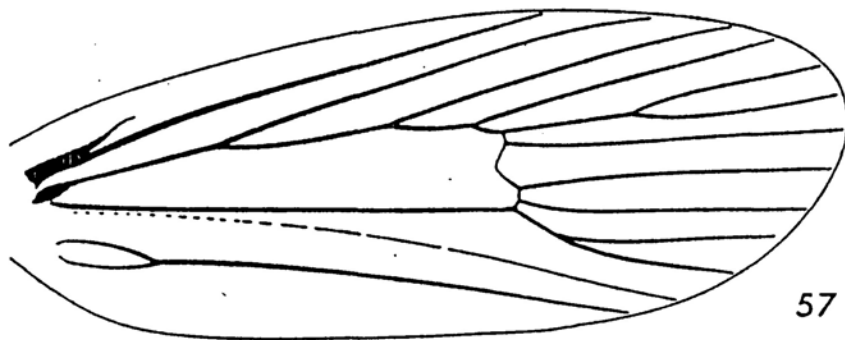
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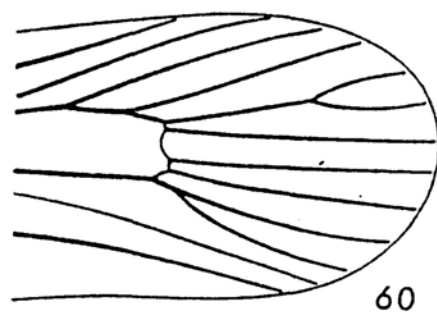
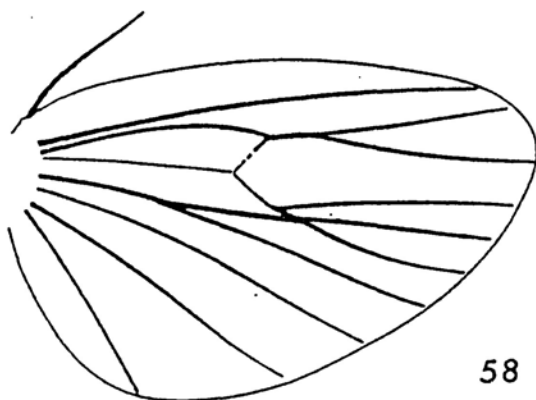
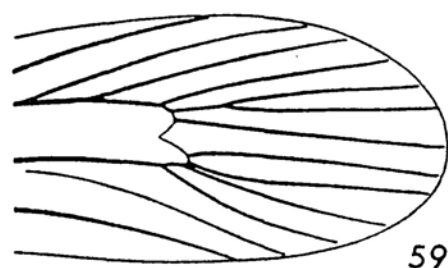
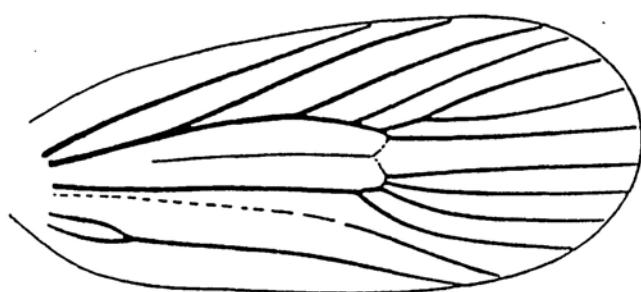
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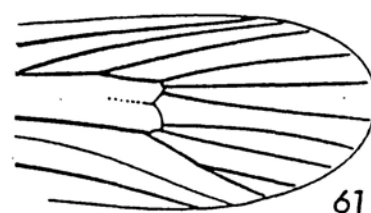
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Figs 54-57 wing venation of Timocratica. 54-56, T. nivea sp. n. 57, T. venifurcata sp. n.

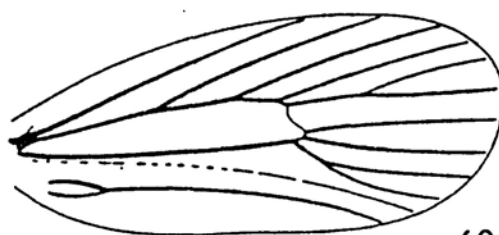


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62

Figs 58-62 Wing venation of Timocratica. 58-61, T. butyrota (Meyrick). 62, T. parvifusca sp. n.

(Figs 52, 63, 65, 71)

Yponomeuta grandis Perty, [1833], Delectus Anim. articulorum Brasil 3:163; pl. 32, fig. [12] [legend of figure transposed with Pyralis bahiensis Perty]. Holotype [♂ ?], BRAZIL: Piaui, (Spix & Martius) (lost).

Cryptolechia grandis (Perty); Zeller, 1854:378 [transcription]; Felder & Rogenhofer, 1875:pl. 139, fig. 56 [adult]; Zeller, 1877:260 [list].

Cryptolechia bahiensis (Perty); Walker, 1864:712 [catalogue; name quoted from figure legend in Perty, [1833]:pl. 32, fig. 12].

Stenoma grandis (Perty); Walsingham, 1913:185 [catalogue].

Timocratica grandis (Perty); Busck, 1935:16 [catalogue].

♂ 22-26mm. Frons yellowish-fuscous. Second segment of labial palpi dark fuscous, outer half above and internally white, with yellowish-fuscous scales below; third segment white, progressively dark grey internally towards apex. Antennae with scape and base of flagellum white, progressively fuscous to apex. Legs golden-ochreous, fore tibiae and tarsi greyish-fuscous above. Fore wings with apex, termen and tornus evenly rounded; all veins free; underside golden-yellow, slightly tinged with fuscous along apex. Hind wings golden-yellow. Abdomen golden-ochreous, first tergite and all sternites white.

♀ 28-30mm. Fore wings broader than males. Hind wings deep golden-yellow.



Fig. 63 Timocratica grandis (Perty), ♀, French Guiana (BMNH).



Fig. 64 Timocratica xanthotarsa sp. n., ♂, holotype Panama (NMNH, Washington).

Genitalia ♂ (Fig. 65). Uncus slightly narrowed at base, apex strongly concave. Apex of gnathos pointed. Digitate processes of juxta very long, reaching middle of gnathos, distal half of dorsal side with sparse setae. Lateral margins of valvae nearly parallel. Aedeagus bent ventrad; vesica with cornutus undeveloped, represented as a sclerotized area, and with many small acute-pointed spines.

Genitalia ♀ (Fig. 52). Margin of ostium bursae expanded posteriorly, slightly concave at middle. Antrum cylindrical. Ductus bursae straight, nearly cylindrical, posterior quarter sclerotized, with few longitudinal wrinkles. Corpus bursae oblong, walls, as in ductus bursae, densely scobinated. Signum an elongate plate constricted at middle, concave at both extremities.

REMARKS. T. grandis has golden-yellow hind wings and is thus very similar to bicornuta, constrictivalva and xanthotarsa. However it can easily be distinguished from bicornuta by its fuscous fore tibiae, and from the other two species by its fuscous fore tarsi.

One female from French Guiana has the fore wings with veins CuA_1 and CuA_2 stalked.

In plate 32 of Perty's work two species of stenominae are illustrated. Figure 12 represents a large species with white fore wings and yellow hind wings, named Pyralis bahiensis; fig. 13 represents a smaller species with pale wings and black markings on the fore wings, named Yponomeuta grandis. However, as may easily be recognized from the descriptions,

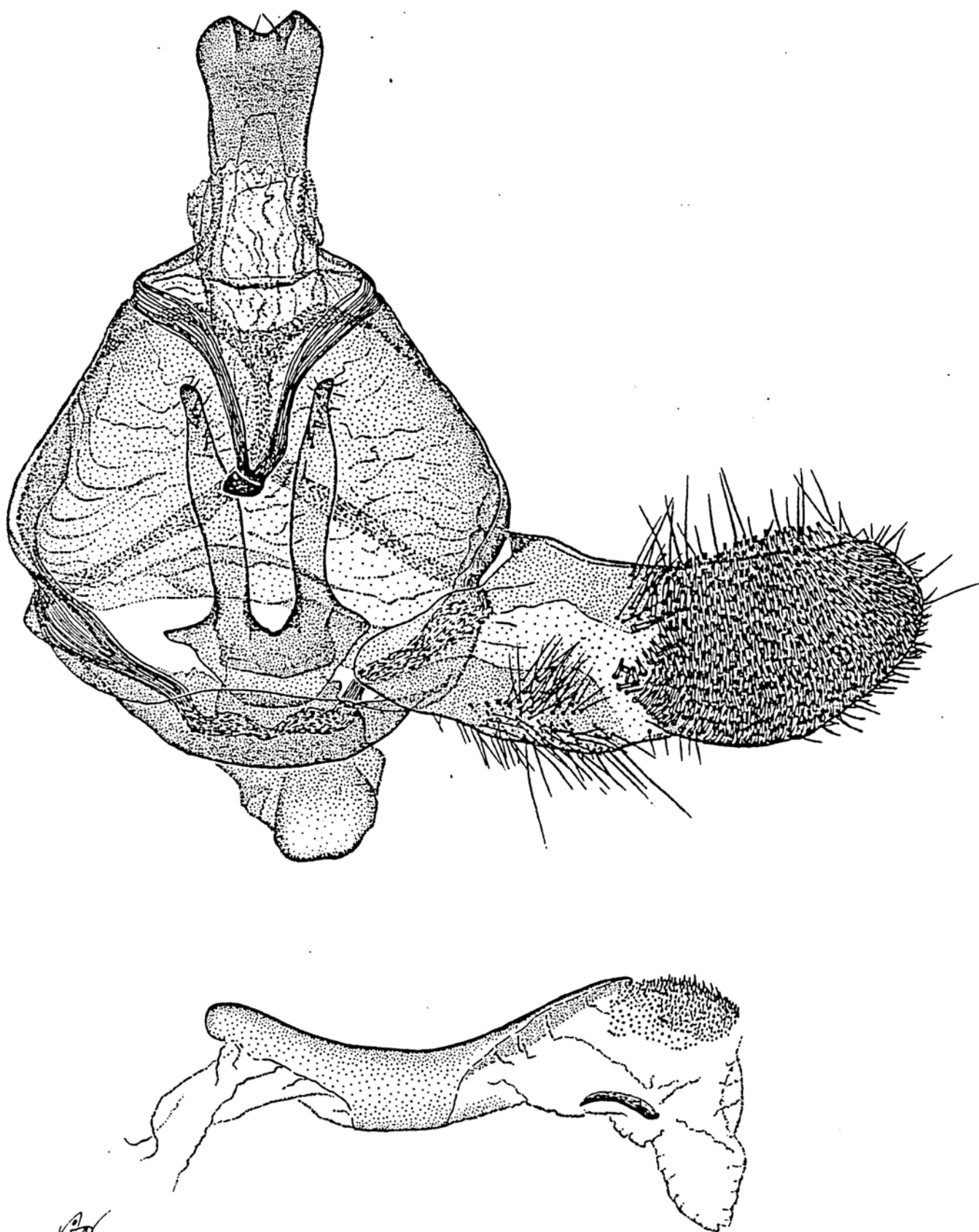


Fig. 65 Genitalia of Timocratica grandis (Perty), ♂,
Panama (slide, Becker; NMNH, Washington).

there is no doubt that the legends were transposed and the large white species represents grandis, while the smaller represents bahiensis. With the exception of Walker (1864), all subsequent authors (Zeller (1854, 1877), Felder & Rogenhofer (1875), Walsingham (1913) and Busck (1935)), " recognized fig. 12 as representing grandis.

In the BMNH and NMNH there were series, totalling twenty five specimens, with white fore wings and golden-yellow hind wings, identified as T. grandis, and agreeing with Perty's figure 12. Upon closer examination it was found that they represent four distinct species. In the absence of other evidence it seems reasonable to apply the name grandis to the only species with golden-yellow hind wings of this complex known to occur in the Amazon Basin of Brazil (type-locality of grandis). According to Horn & Kahle (1936: 206), Perty's types were deposited in the zoologische Staatssammlung, Munich. Dr. Dierl informed (pers. comm.) that the types were not found in that museum and are believed to have been destroyed during World War II.

BIOLOGY. Moths have been collected in May in Panama.

DISTRIBUTION (Fig. 71). Brazil (Amazon Basin), French Guiana, Panama. Despite its wide geographical distribution, this species appears to be restricted to a single Life Zone, Tropical Moist Forest. It is interesting that the other species with hind wings and abdomen golden-ochreous, except for bicornuta, were also collected in this Life Zone.

MATERIAL EXAMINED.

17 ex. (11 ♂, 6 ♀; 3 ♂, 1 ♀ genitalia preparations).

Brazil: 1 ♂, Amazonas, São Paulo de Olivença (Staudinger) (MNHU, Berlin); 1 ♂, Pará, Belém ('Pará') ([Bates]) (BMNH); 1 ♂, 3 ♀, Pará, Belém ('Pará') (Moss) (BMNH). French Guiana: 1 ♂, Guyanne, Cayenne (Felder) (BMNH); 2 ♂, 1 ♀, Ibidem (Deyrolle) (BMNH); 1 ♂, Ibidem (BMNH); 2 ♂, Guyanne, St. Jean, R. Maroni (Le Mout) (BMNH); 2 ♀, Guyanne, R. Maroni (Bar) (BMNH). Panama: 2 ♂, Canal Zone, Barro Colorado Island, 10-17.v.1964 (Duckworth) (NMNH, Washington).

Timocratica bicornuta sp. n.

(Figs 66, 69, 71)

♂ 18-20mm. Frons white, edged with fuscous. Second segment of labial palpi with proximal half below tinged with ochreous, distal half fuscous, dark fuscous above, except near articulations; third segment white, dark grey internally. Antennae white; flagellum somewhat yellow towards apex. Legs golden-yellow, fore tarsi dark fuscous above. Fore wings with apex rounded or somewhat angled, all veins free; underside golden-yellow, slightly tinged with fuscous along apex and termen. Hind wings golden-yellow. Abdomen golden-yellow, first tergite and all sternites white.

Genitalia ♂ (Fig. 66). Uncus with lateral margins parallel, apex concave. Apex of gnathos blunt. Digitate processes of juxta bent outwards, diverging progressively from each other towards apex, with long setae apically. Valvae long, narrow, lateral margins nearly parallel. Aedeagus bent ventrad at

basal third, vesica with two strong bent cornuti opposite each other.

Genitalia ♀ (Fig. 69). Margin of ostium bursae with two small posteriorly-directed lobes. Antrum very broad medially. Ductus bursae somewhat broadened towards corpus bursae. Corpus bursae nearly globular, walls, as in ductus bursae, densely scobinated. Signum a rectangular plate.

REMARKS. T. bicornuta is easily separated from xanthotarsa and constrictivalva by its fuscous fore tarsi, and from grandis by its yellow fore tibiae. It is also the only species in the group with two strong cornuti in the vesica.

The only female agrees in very detail with the males but is doubtfully associated with this species. Only males from the same locality, or other females from where the males were collected, could clarify its relationship.

BIOLOGY. The only specimen with a date was collected around end of March-beginning of April.

DISTRIBUTION (Fig. 71). Brazil (Southeastern coast), French Guiana. The holotype of this species, the only Brazilian specimen bearing detailed data, was collected in the Subtropical Lower Montane Wet Forest. The female from French Guiana came from the Tropical Moist Forest like the others of the grandis complex. This difference in ecological adaptation may indicate that the female belongs to a different species.

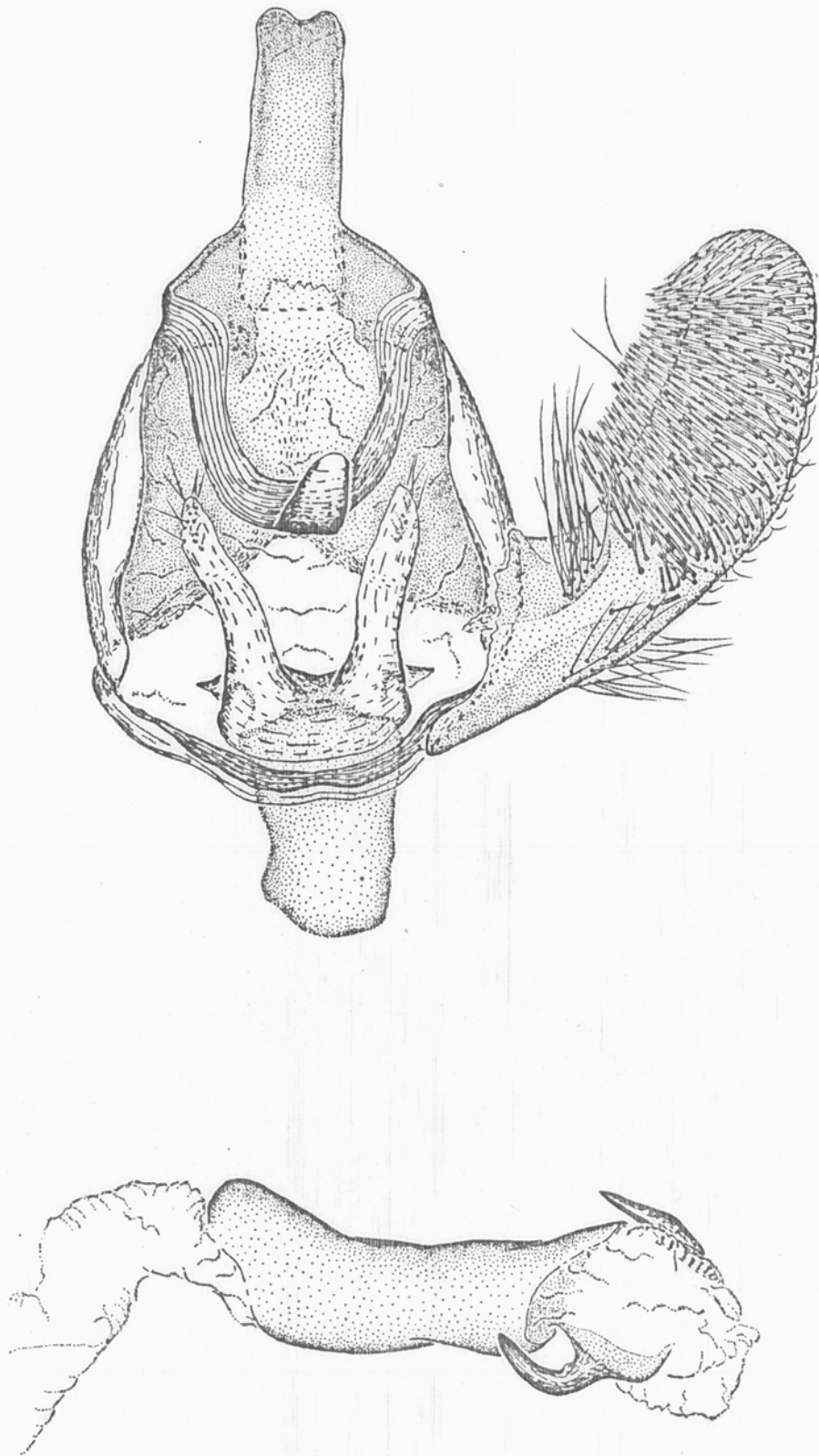


Fig. 66 genitalia of Timocratica bicornuta sp. n., ♂, paratype, Brazil (slide no. 21018; BMNH).

MATERIAL EXAMINED.

4 ex. (3 ♂, 1 ♀; 3 ♂, 1 ♀ genitalia preparations).

Holotype ♂, Brazil: Rio de Janeiro, Pico do Itatiaia, 28.iii.-1.iv.1958 (Kettlewell) (genitalia slide 20978, Duckworth; BMNH).

Paratypes. Brazil: 2 ♂, (Ragonot) (BMNH).

Specimen excluded from the type-series. French Guiana: 1 ♀, Guyanne, St. Jean, R. Maroni (Le Moult) (BMNH).

Timocratica xanthotarsa sp. n.

(Figs 64, 67, 71)

♂ 21-22mm. Frons white, edged with fuscous. Second segment of labial palpi ochreous below, basal two-thirds above black, distal third and internal side white; basal third of third segment white, apical two-thirds black. Antennae white, somewhat tinged with yellow towards apex. Legs golden-yellow above, white below. Fore wings with apex, termen and tornus evenly rounded; all veins free; underside golden-ochreous, slightly tinged with fuscous along apex. Hind wings golden-yellow. Abdomen golden-ochreous, first tergite and sternites white.

Genitalia ♂ (Fig. 67). Uncus with lateral margins nearly parallel, apical margin concave. Apex of gnathos long, strongly sclerotized. Digitate processes of juxta tapered towards apex, apex pointed, dorsal side with sparse setae apically. Valvae with basal third narrow, distal two-thirds wide, lateral margins evenly rounded; apex acute-rounded.

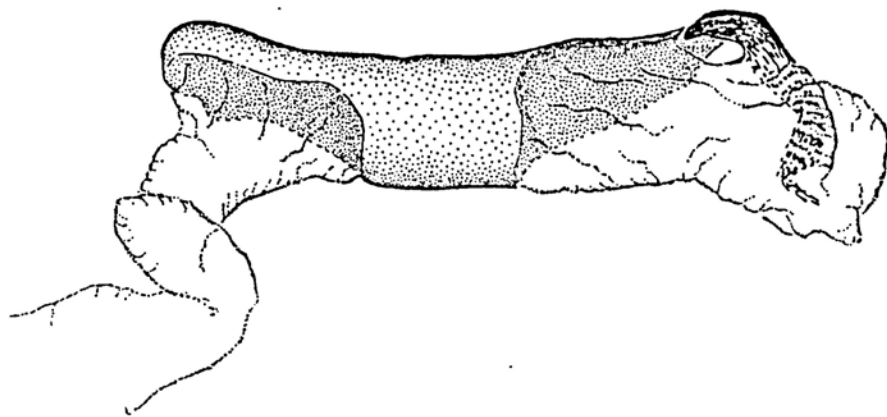
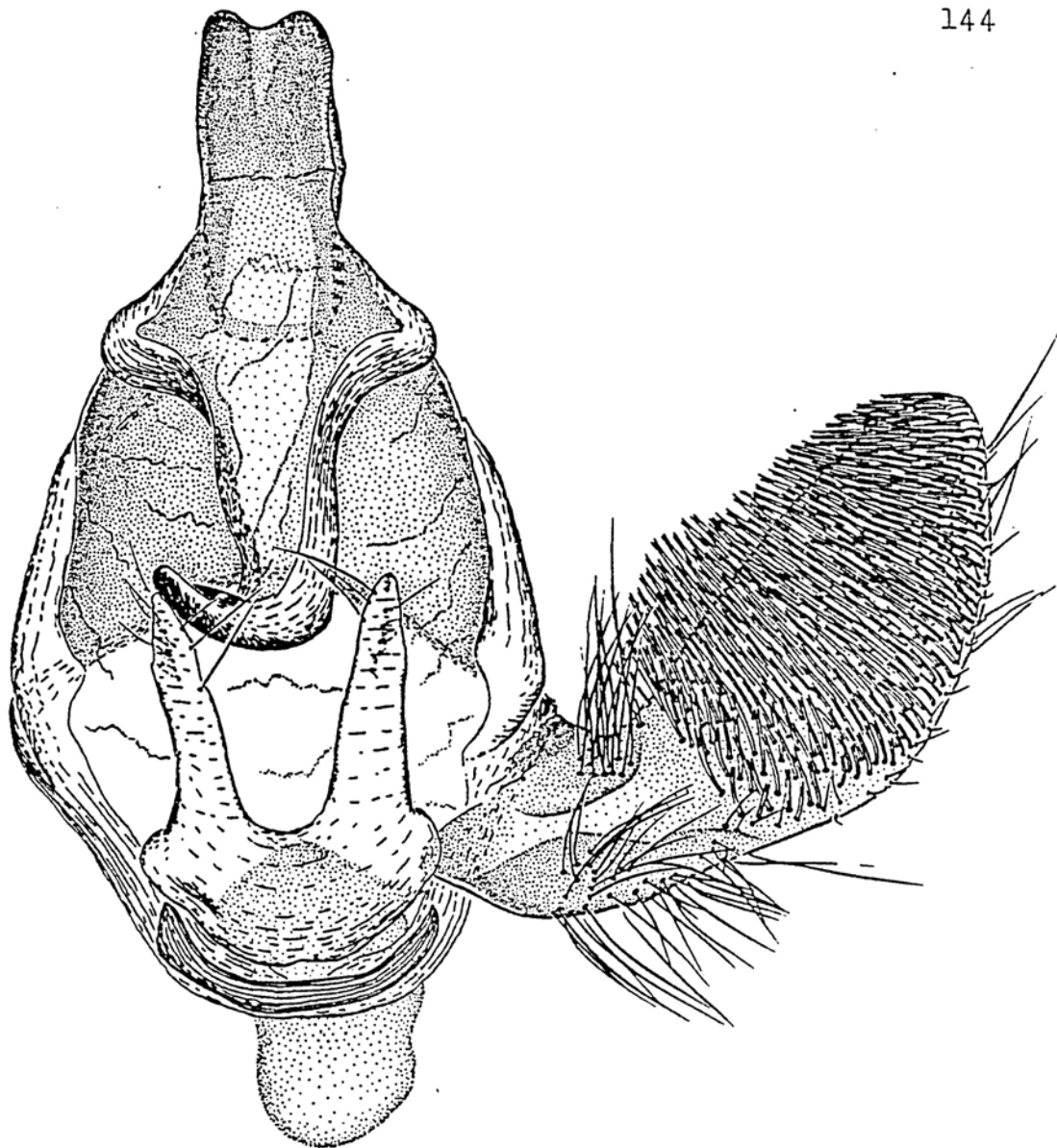


Fig. 67 Genitalia of Timocratica xathotarsa sp. n., ♂, paratype, Panama (slide, Becker; NMNH, Washington).

Aedeagus slightly bent ventrad, vesica with strong curved cornutus.

REMARKS. T. xanthotarsa is easily distinguished from grandis and bicornuta by its golden-yellow and white legs, and from constrictivalva by the unmodified gnathos.

BIOLOGY. Moths have been collected at the begining of May.

DISTRIBUTION (Fig. 71). Panama. The two type males were collected in Tropical Moist Forest.

MATERIAL EXAMINED.

2 ♂ (1 ♂ genitalia preparation).

Holotype ♂, Panama: Barro Colorado Island, 1-9.v.1964
(Duckworth) (NMNH, Washington; no. 76654).

Paratype ♂, Panama: Barro Colorado Island, 1-9.v.1964
(Duckworth) (NMNH, Washington).

Timocratica costrictivalva sp. n.

(Figs 68, 71)

♂ 21mm. Frons white. Antennae with scape and basal half of flagellum white. Legs golden-yellow above, white below. Fore wings with apex, termen and tornus evenly rounded; veins free; underside golden-yellow, slightly tinged with fuscous along apex. Hind wings golden-yellow. Abdomen golden-ochreous, first tergite and all sternites white.

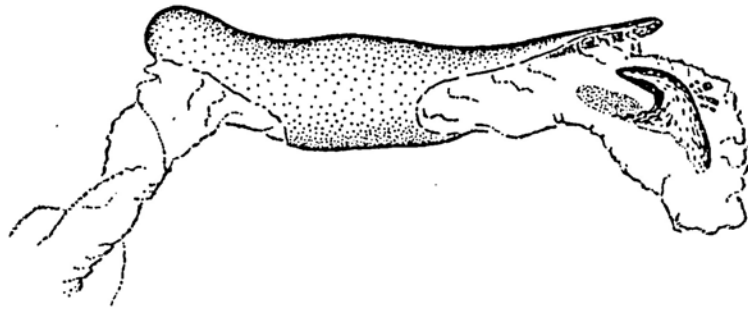
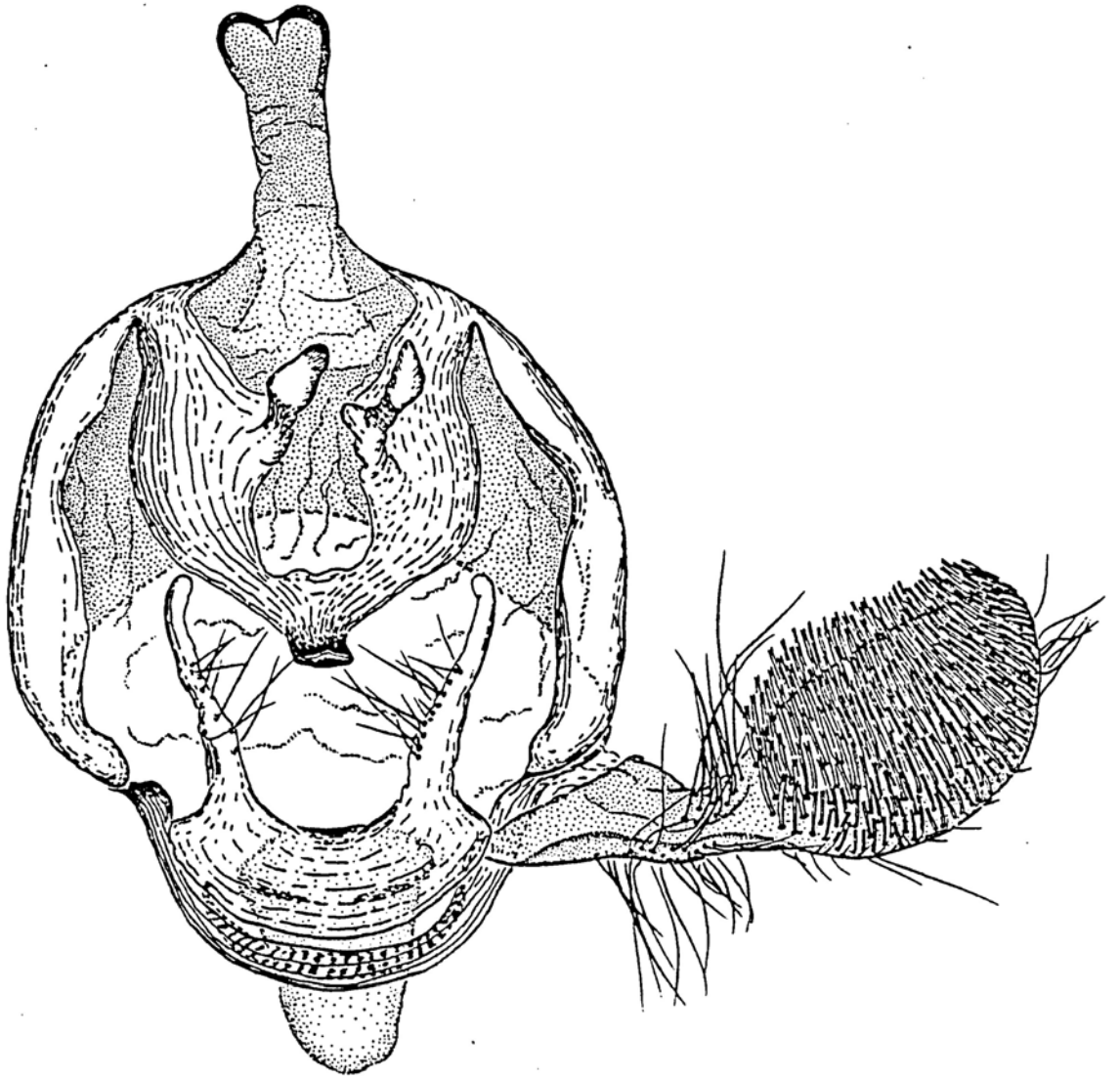


fig. 68 Genitalia of Timocratica constrictivalva sp. n.,
holotype, Ecuador (slide no. 21013; BMNH).

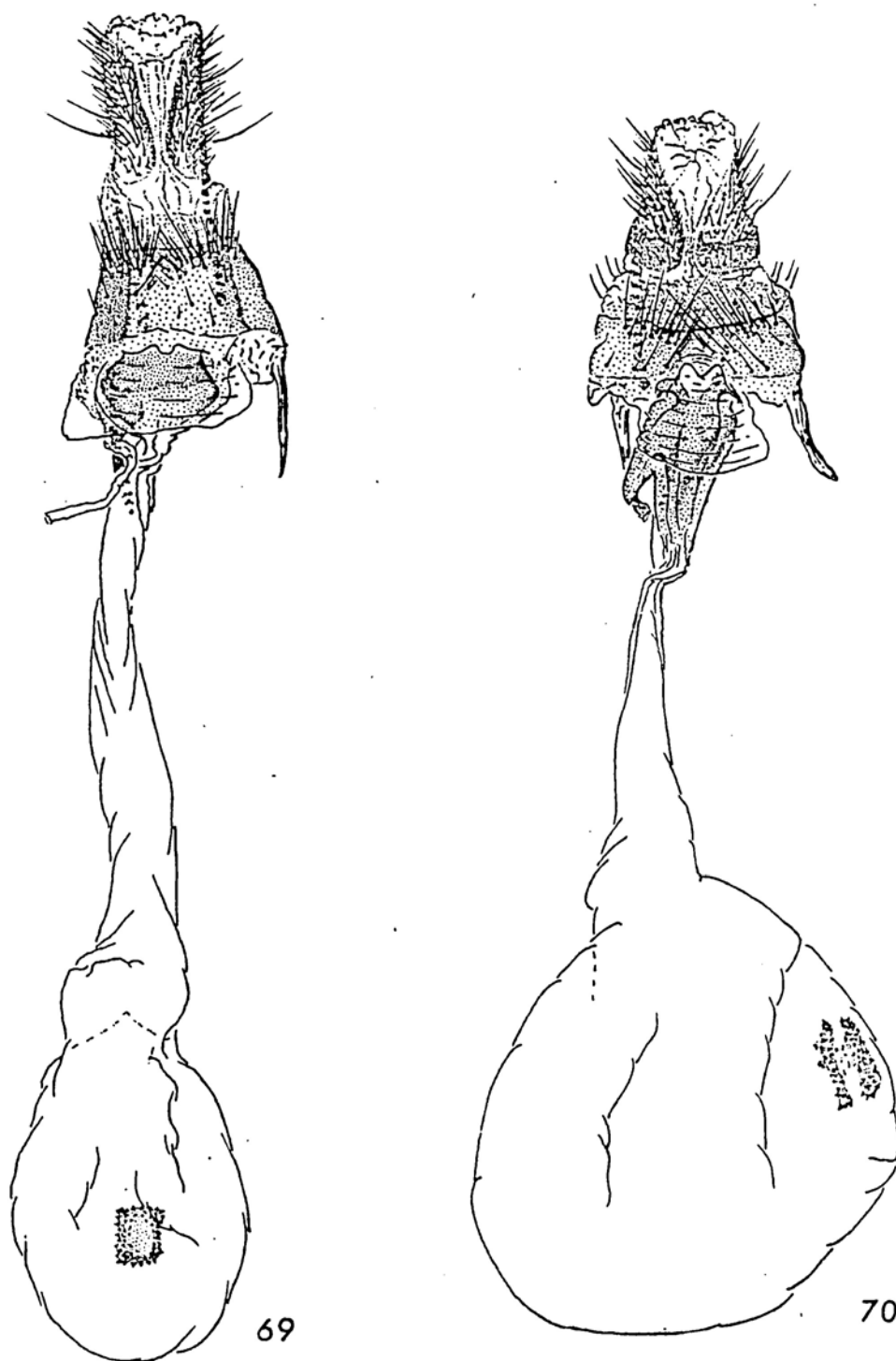
Genitalia ♂ (Fig. 68). Basal two-thirds of uncus narrow, apical third broadened, apex concave. Gnathos with two long, digitate, ventrally-directed processes basally; apex triangular, dorsoventrally compressed. Digitate processes of juxta long and narrow, widely separated, with long setae at middle. Basal third of valvae strongly constricted, distal two thirds abruptly rounded. Aedeagus nearly straight, vesica with long, strong, curved cornutus and few smaller spines opposite.

REMARKS. T. constrictivalva is very similar externally to xanthotarsa, but can easily be distinguished by its constricted valvae; from grandis and bicornuta it can be separated by the absence of fuscous scales on its legs. T. species 3 is possibly the female of this species (see details under that form).

The only specimen representing constrictivalva is not in very good condition. It lacks the palpi, all the right and half of the left antenna, one of each of the middle and hind legs, as well as most of the scales on the thorax and remaining legs. Nevertheless, as the genitalia are so peculiar and distinctive, it cannot be confused with any other species in the genus. It therefore seems justified to name and describe it.

BIOLOGY. Unknown.

DISTRIBUTION (Fig. 71). Ecuador (Eastern side of the Andes). The only specimen was collected in the Tropical Moist Forest.



Figs 69-70 Genitalia of Timocratica ♀. 69, T. bicornuta
 sp. n., French Guiana (slide no. 21016; BMNH).
 70, T. species 3, peru (slide, Becker; NMNH,
 Washington).

MATERIAL EXAMINED.

Holotype ♂, Ecuador: Pastaza, Sarayacu (Buckley)
(genitalia slide no. 21013, Becker; BMNH).

Timocratica species 3

(Figs 70, 71)

♀ 18mm. Externally very similar to constrictivalva. Veins CuA_1 and CuA_2 stalked on fore wings.

Genitalia ♀ (Fig. 70). Margin of ostium bursae expanded posteriorly as two lobes. Antrum long, somewhat broadened at middle, with few strong longitudinal wrinkles. Ductus bursae constricted posteriorly, broadening progressively towards corpus bursae. Corpus bursae wide, globular, walls, as in ductus bursae, densely scobinated. Signum a single subrectangular plate, weakly sclerotized along middle.

REMARKS. The specimen considered here is externally very similar to constrictivalva and xanthotarsa, and may well represent the female of the former species but differs from it by the stalked veins CuA_1 and CuA_2 of the fore wings.

BIOLOGY. Unknown.

DISTRIBUTION (Fig. 71). Peru (Eastern side of the Andes). The single specimen was collected in the Tropical Moist Forest.

MATERIAL STUDIED.

Peru: 1 ♀, Loreto, Iquitos (Strecker) (NMNH, Washington).

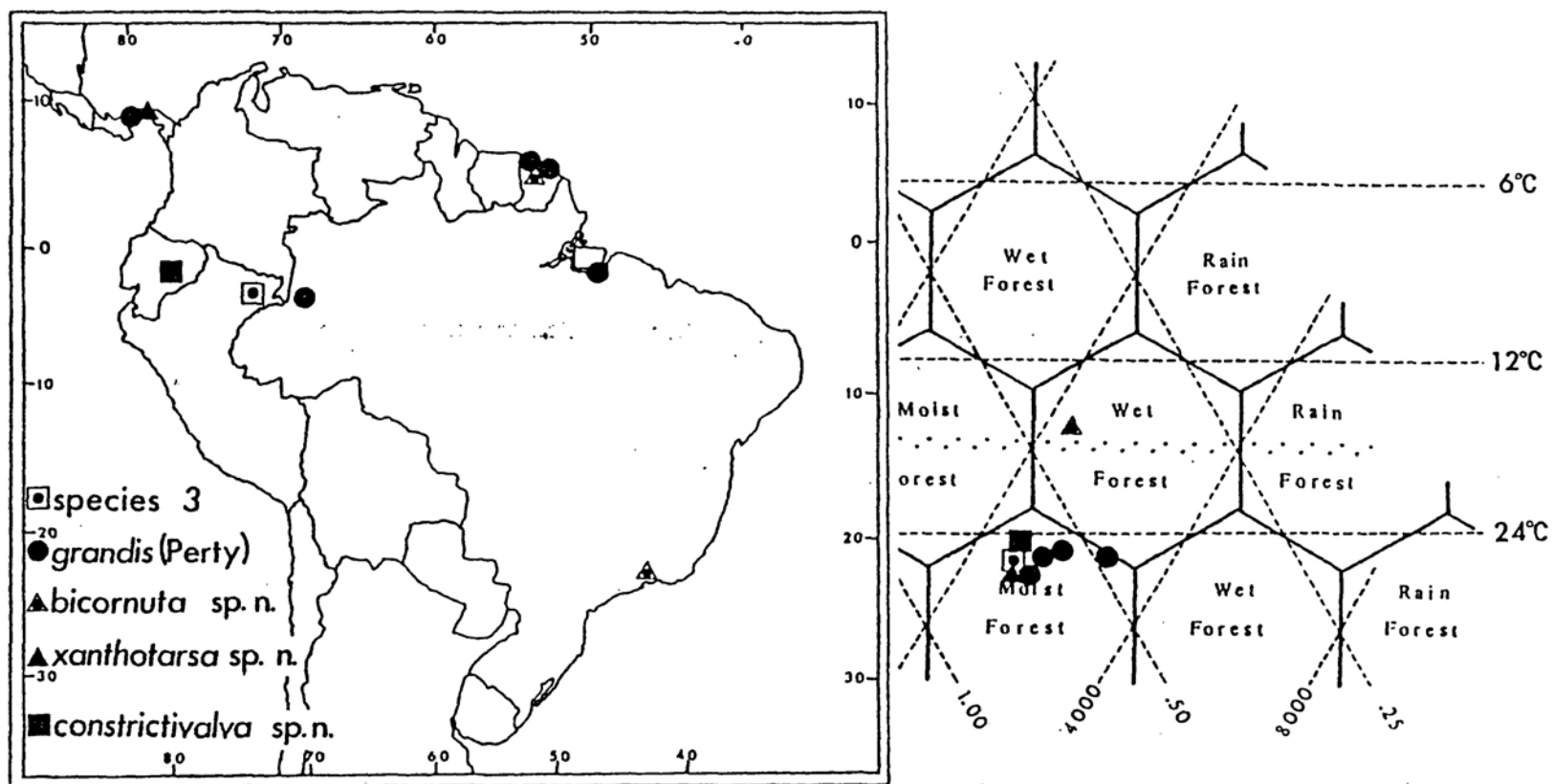


Fig. 71 Geographical and ecological distribution of the *grandis*-complex of *Timocratica*.

The xanthosoma-complex

Hind wings white or slightly tinged with golden-yellow.
Abdomen golden-ochreous above.

Timocratica subovalis (Meyrick)

(Figs 72, 82)

Stenoma subovalis Meyrick, 1932, Exot. Microlepidopt. 4:304.

Holotype ♂, BRAZIL: Amazonas, Ponte Nova, Rio Xingu
(genitalia slide, Busck; NMNH, Washington) [examined].

Stenoma stomatocosma Meyrick, 1932, Exot. Microlepidop. 4:

304. Holotype ♂, BRAZIL, Tefé, 1x (Fassl) (genitalia
slide, Busck; NMNH, Washington) [examined]. Syn. n.

Stenoma subovalis meyrick; Busck, 1935:58 [catalogue].

Timocratica stomatocosma (Meyrick); Busck, 1935:17
[catalogue].

Timocratica subovalis (Meyrick); Duckworth, 1962:113
[new comb.].

♂ 16-17mm. Frons white, edged with fuscous. Second segment of labial palpi golden-ochreous below, basal half dark fuscous above, white internally and at distal articulation; third segment white with fuscous scales towards apex. Antennae ochreous with fuscous scales, scape white. Fore coxae golden-yellow below, tibiae and tarsi dark fuscous; middle and hind tarsi golden-yellow. Fore wings with costa evenly rounded, apex rounded, somewhat angled, termen and tornus evenly rounded; veins free; underside of both wings golden-yellow above cell. Hind wings white above. Abdomen golden-ochreous, first tergite, anal tuft and sternites white.

Genitalia ♂ (Fig. 72). Uncus slightly broadened basally or with lateral margins nearly parallel; apex strongly concave, nearly bifurcate. Apex of gnathos short, pointed. Digitate processes of juxta well separated basally; distal half progressively pointed, covered with long setae dorsally. Valvae wide, dorsal margin straight, ventral margin evenly rounded. Aedeagus bent ventrad, vesica with long, strong, bent cornutus and many smaller, pointed spines opposite.

REMARKS. T. subovalis is the only species with golden-ochreous abdomen and white hind wings which has the middle and hind tarsi golden-yellow.

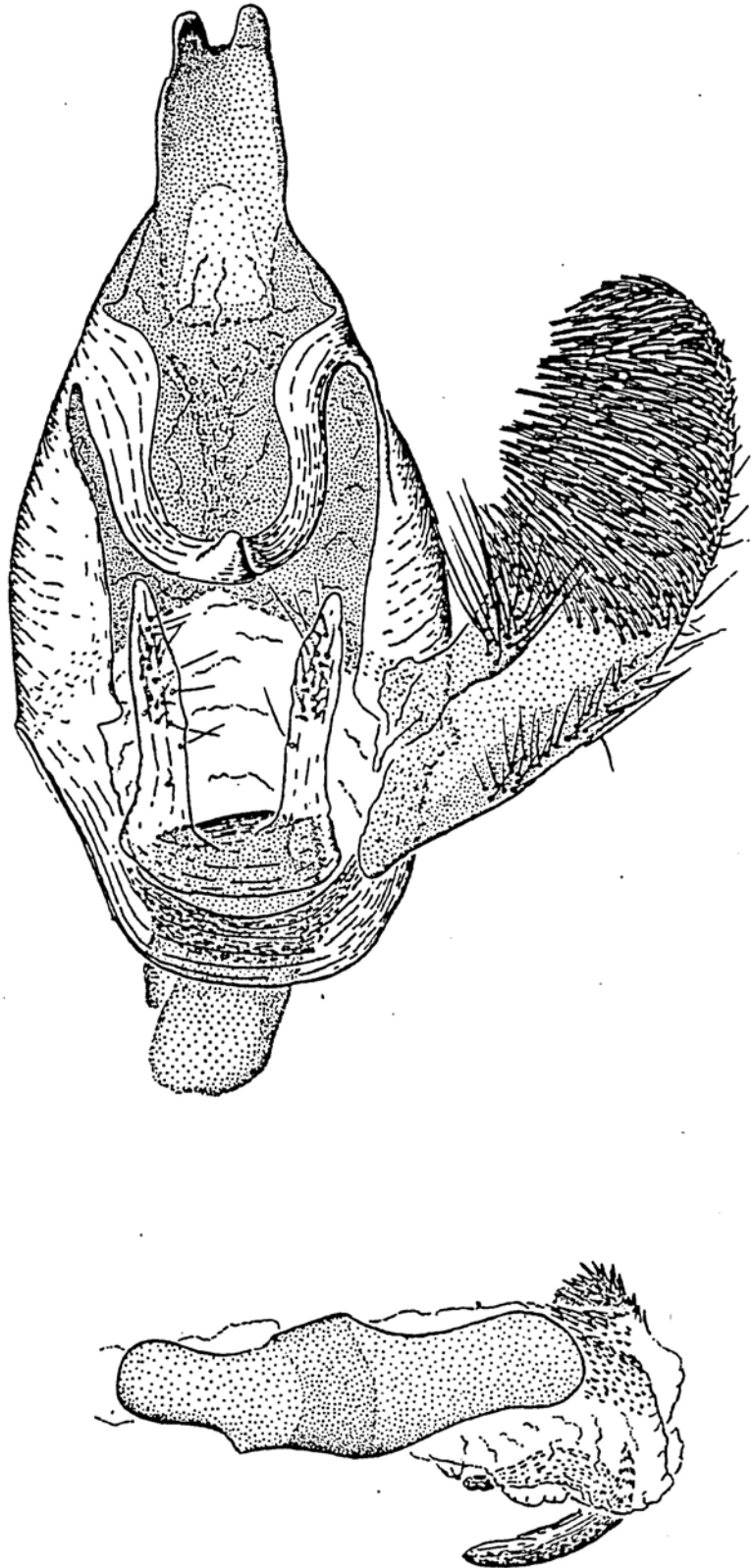
The holotype of stomatocosma is an anomalous specimen in which m_3 and CuA_1 are shortly stalked in the right fore wing and stalked from the middle in the left. Meyrick considered it a distinctive species, probably because of this feature, since both holotypes agree in all other details, including genitalia.

BIOLOGY. The specimen from Tefé was collected in September.

DISTRIBUTION. Brazil (Amazon Basin). The two type-localities belong to the same Life Zone, Tropical Moist Forest (Fig.82).

MATERIAL EXAMINED.

Known only from the holotypes.



V. 80

Fig. 72 Genitalia of Timocratica subovalis (Meyrick), ♂, holotype, Brazil (slide, Busck; NMNH, Washington).

(Figs 73, 82)

♀ 17mm. Head white. Second segment of labial palpi white, basal half dark fuscous above; third segment white, progressively fuscous towards apex. Legs white; fore coxae and fore femora above golden-yellow, tibiae and tarsi dark fuscous below; middle and hind tarsi golden-yellow below. fore wings with costa evenly rounded, apex angled, termen and tornus oblique-rounded; R_4 and R_5 connate basally, CuA_1 and CuA_2 stalked at basal fourth; underside golden-yellow, slightly tinged with fuscous along apex. Hind wings slightly tinged with golden-yellow above, deeper towards apex, underside golden-yellow above cell and along termen. Abdomen golden-ochreous, first tergite, anal tuft and sternites white.

Genitalia ♀ (Fig. 73). Margin of ostium bursae slightly concave at middle. Antrum straight, nearly cylindrical. Ductus bursae nearly cylindrical, posterior third thickened, wrinkled, strongly scobinated; anterior two-thirds wrinkled longitudinally. Corpus bursae globular. Signum an irregular, strongly concave plate.

REMARKS. The specimen described here is the only one that combines an ochreous abdomen and golden-yellow hind wings with fore tarsi which are white above.

BIOLOGY. unknown.

DISTRIBUTION (Fig. 82). Brazil (Amazon Basin); in the Tropical moist forest.

MATERIAL EXAMINED.

Brazil: 1 ♀, Pará, Belém ('Pará') (Moss) (genitalia slide 21218, Becker; BMNH).

Timocratica amseli Duckworth, sp. rev.

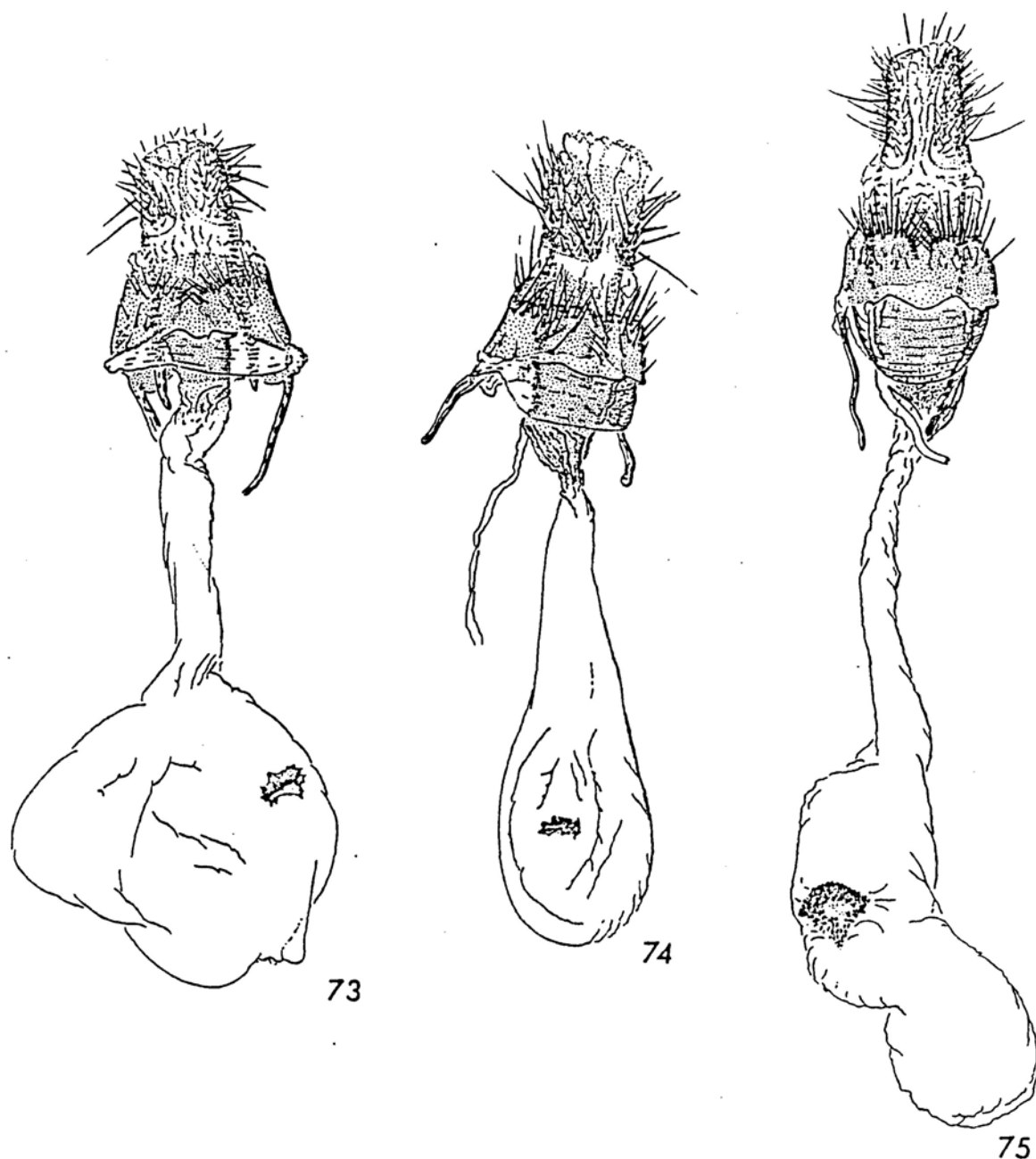
(Figs 74, 76, 82.)

Timocratica ? albella Amsel, 1956, Boln Ent. venez. 10:306; pl. 63, fig. 6; pl. 107, fig. 8. Holotype ♂, VENEZUELA: Distrito Federal, Caracas, Los Venados, vi-vii. 1937 (Vogl) (genitalia slide 2616, Becker; ZSBS, Munich) [examined]. Junior secondary homonym of Depressaria (Volucra) albella Zeller, 1839, Isis, Leipzig 1839:197.

Timocratica amseli Duckworth, 1962, Proc. ent. soc. wash. 64:113. Proposed as objective replacement name for Timocratica ? albella Amsel, 1956 (q.v.).

[Timocratica xanthosoma (Dognin); Duckworth, 1966:197 (partim). Misidentification.]

♂ 13mm, ♀ 17mm. head white. Basal two-thirds of labial palpi ochreous externally, basal half dark fuscous above, distal third and internally white; third segment white basally, progressively fuscous towards apex. Fore coxae golden-yellow below, femora and basal two-thirds of tibiae golden-ochreous above, distal two-thirds of tibiae, and tarsi dark fuscous; middle tarsi tinged with ochreous below. Fore wings with basal third of costa gently arched, distal two-thirds nearly straight; apex rounded, somewhat angled; termen and tornus oblique-rounded; veins free; basal



V. 81
 Figs 73-75 Genitalia of Timocratica ♀. 73, T. species 4, Brazil (slide no. 21218; BMNH). 74, T. amseli Duckworth, paratype of T. albella Amsel, Venezuela (slide no. 2617; ZSBS, Munich). 75, T. xanthosoma xanthosoma (Dognin), holotype of Stenoma sacra Meyrick, French Guiana (slide no. 5641, Clarke; BMNH).

third of costa tinged with golden-yellow below. Hind wings white. Abdomen golden-ochreous above, first tergite and sternites white.

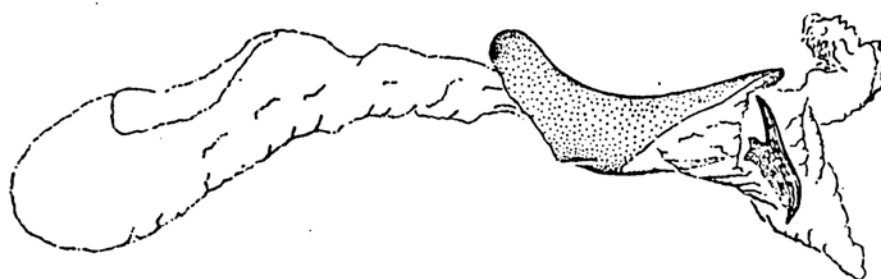
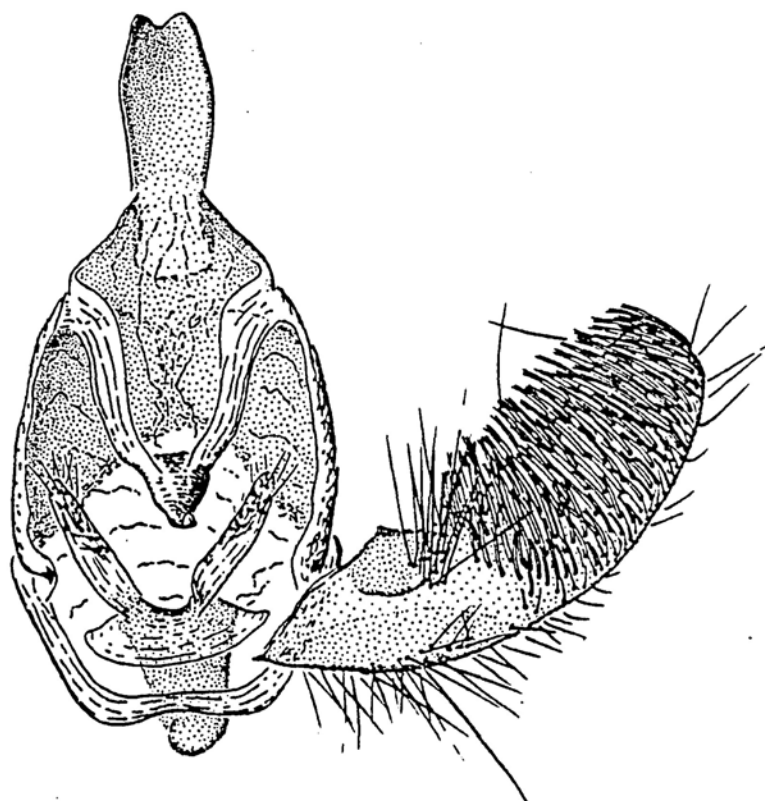
Genitalia ♂ (Fig. 76). Uncus somewhat broadened at middle. Apex of gnathos narrow, nearly pointed. Digitate processes of juxta very long, compressed laterally at base, distal half with several long setae dorsally. Margins of valvae parallel, evenly rounded. Aedeagus strongly bent ventrad at basal third, vesica with strong cornutus.

Genitalia ♀ (Fig. 74). Margin of ostium bursae slightly concave at middle. Antrum wide, anterior half narrowing progressively towards ductus bursae, strongly wrinkled. Ductus bursae widening progressively towards corpus bursae. Corpus bursae pear-shaped. Signum an irregular, sclerotized plate, concave across middle.

REMARKS. T. amseli is easily distinguished from xanthosoma by its white fore wing costa, and from fuscipalpalis by the ochreous tinge on the second segment of labial palpi (almost dark fuscous in fuscipalpalis).

Duckworth (1966:197) synonymized this species with xanthosoma, but after examination of the types of both species they proved to be distinct, what is supported by its different ecological distribution.

BIOLOGY. Moths have been collected in June-July.



V. 80

Fig. 76 Genitalia of Timocratica amseli Duckworth, ♂, holotype of T. albella Amsel, Venezuela (slide no. 2616; ZSBS, Munich).

DISTRIBUTION (Fig. 82). Northern Venezuela, in the Tropical Dry forest.

MATERIAL EXAMINED.

1 ♀ (1 ♀ genitalia preparation).

Venezuela: Distrito Federal, Caracas, Berg Avila, 1000m, vi-vii (vogl) (ZSBS, Munich) (paratype ♀).

Timocratica venifurcata sp. n.

(Figs 57, 77, 78, 82)

♂ 16-17mm. Head white. Second segment of labial palpi white, basal two-thirds dark grey externally; third segment white, with grey scales near apex. Legs white, distal half of fore tibiae, and tarsi dark fuscous below. Fore wings with costa gently arched, apex rounded, termen and tornus oblique-rounded; R_4 and R_5 , and CuA_1 and CuA_2 respectively stalked; basal half of costa with fuscous and golden-yellow scales below. Hind wings white. Abdomen golden-ochreous, first tergite, anal tuft and sternites white.

Genitalia ♂ (Fig. 77). Uncus wide, lateral margins nearly parallel, apex bifurcate. Apex of gnathos narrow, pointed. Digitate processes of juxta flat, triangular, distal half with long sparse setae. Valvae with basal half wide, narrowing progressively towards apex. Aedeagus bent ventrad, vesica with strong, short cornutus and many smaller spines opposite.

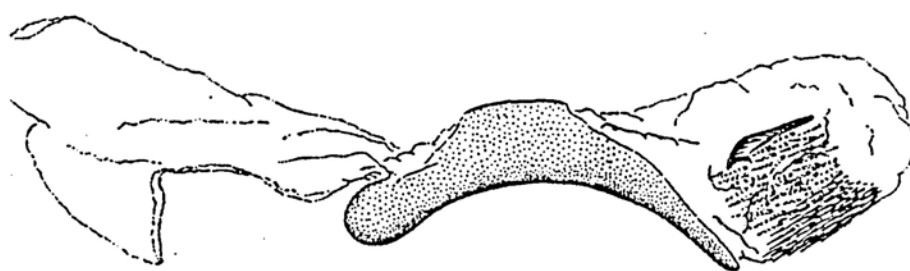
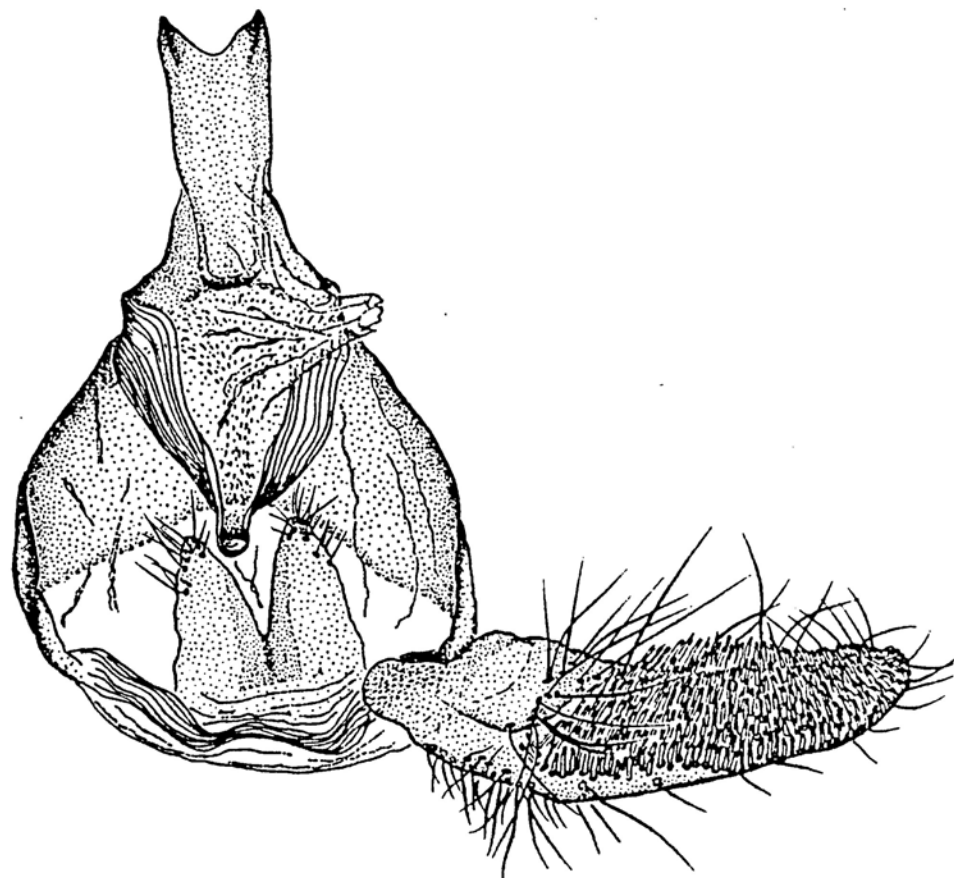


Fig. 77 Genitalia of Timocratica venifurcata sp. n., ♂, paratype, Brazil (slide no. 21240; BMNH).



Fig. 78 Timocratica venifurcata sp. n., ♂, holotype,
Brazil (MN, Rio de Janeiro).



Fig. 79 Timocratica xanthosoma leucocephala ssp. n., ♂,
holotype, Panama (NMNH, Washington).

REMARKS. T. venifurcata is the only white species which has an ochreous abdomen and R_4 and R_5 stalked on fore wings. It can easily be distinguished from all others with ochreous abdomen by the lack of ochreous coloration on its on its palpi and legs.

BIOLOGY. Moths have been collected in November.

DISTRIBUTION (Fig. 82). Brazil (Central Plateau), in the Tropical Premontane moist Forest.

MATERIAL EXAMINED.

2 ♂ (1 ♂ genitalia preparation).

Holotype ♂, Brazil: Distrito Federal, Planaltina, 1000m, 9.xi.1977 (Becker, no. 22208) (MN , Rio de Janeiro).

Paratype ♂, Brazil: Distrito Federal, 1000m, 11.xi.1976 (Becker, no. 19502) (BMNH).

Timocratica fuscipalpalis sp. n.

(Figs 80, 82)

♂ 12mm. Frons white, edged with fuscous. Second segment of labial palpi dark fuscous, tinged with ochreous basally below, white internally and at distal articulation; third segment white, fuscous internally. Antennae light ochreous, scape white. Fore coxae tinged with golden-yellow below; middle and hind legs white. Fore wings with basal third of costa gently arched, apex rounded, termen straight, tornus rounded; veins free; costa golden-yellow below. Hind wings

white. Abdomen golden-ochreous above, first tergite and sternites white.

Genitalia ♂ (Fig. 80). Lateral margins of uncus nearly parallel, apex strongly concave, nearly bifurcate. Apex of gnathos broad, rounded. Digitate processes of juxta very long, external margins nearly straight, distal half of internal margins sinuate, distal two-thirds with sparse, irregular row of setae. Dorsal margin of valvae straight, ventral margin with basal third sinuate, middle third parallel to dorsal margin, distal third converging progressively towards apex; apex acute. Aedeagus bent ventrad, vesica with single, strong, bent cornutus.

REMARKS. T. fuscipalpalis is very close to anseli but easily distinguished by the almost dark fuscous second segment of its labial palpi. It can also easily be distinguished from venifurcata by its free veins on fore wings, from subovalis by its plain white hind wings, and from xanthosoma by its white costa.

BIOLOGY. The holotype was collected in April.

DISTRIBUTION (Fig. 82). Southern Venezuela, in the Tropical Premontane Moist Forest, a Life Zone not shared by its closest relatives, anseli and xanthosoma.

MATERIAL EXAMINED.

Holotype ♂, Venezuela: Bolivar, Guayaraca, Auyan Tepui, 1100m, 14.iv.1956 (Fernandez & Rosales) (genitalia slide 3694, Duckworth; NMNH, Washington, no. 76655).

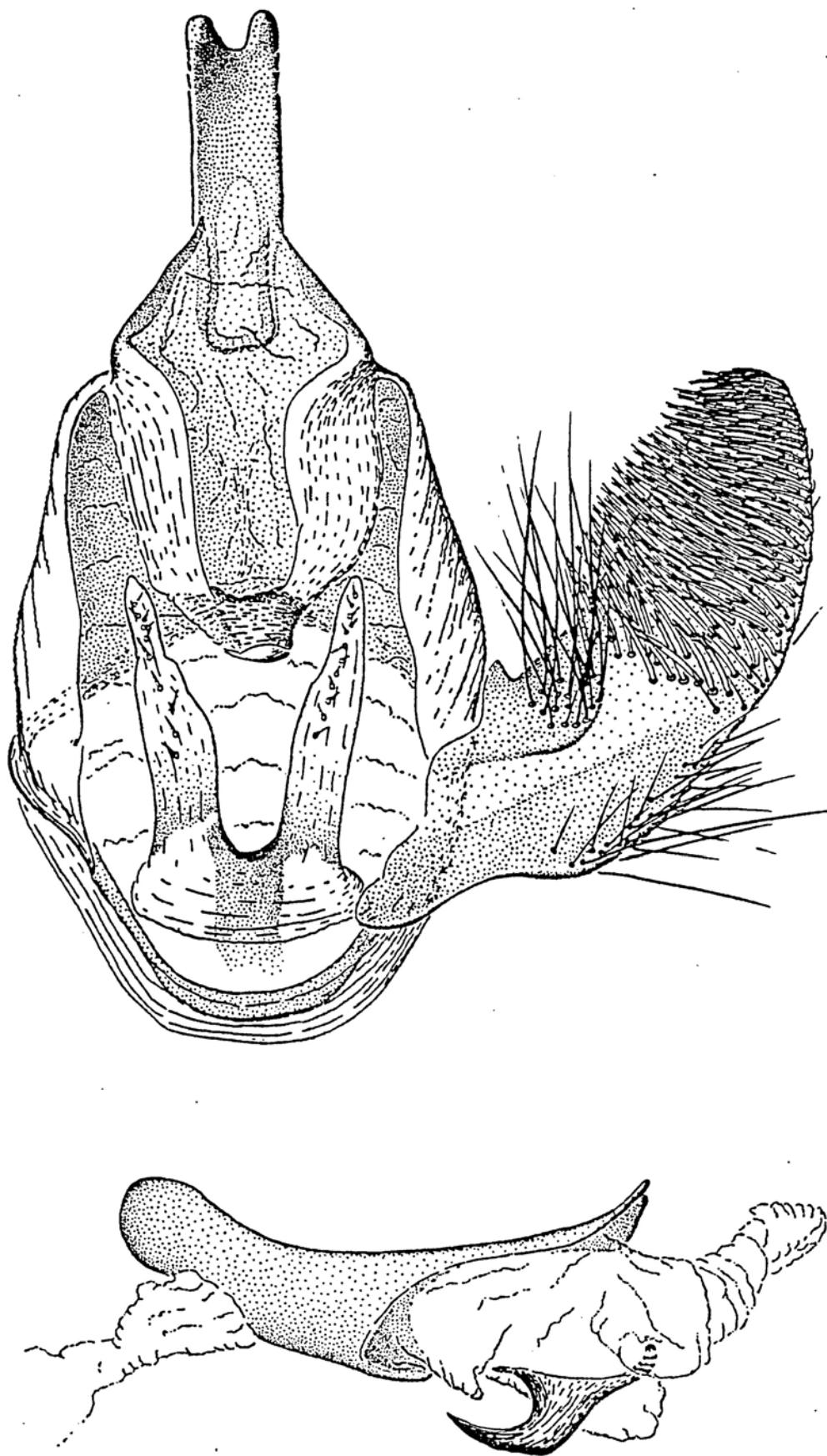


Fig. 80 Genitalia of Timocratica fuscipalpalis sp. n., ♂, holotype, Venezuela (slide, Becker; NMNH, Washington).

Timocratica xanthosoma (Dognin)

Stenoma xanthosoma Dognin, 1913:416.

Timocratica xanthosoma (Dognin); Duckworth, 1966:197
(partim) [synonymy].

♂ 10-17mm, ♀, 13-18mm. Frons white, edged with golden-yellow; vertex golden-yellow or white. Second segment of labial palpi white, basal third dark grey above; third segment white with dark grey scales. Antennae white with dark fuscous scales. Legs white; fore coxae golden-yellow below; fore tibiae, fore and middle tarsi dark fuscous with white scales. Fore wings with base of costa arched, distal two-thirds nearly straight, apex rounded, termen and tornus oblique-rounded; veins free or CuA_1 and CuA_2 stalked; basal third of costa dark fuscous or black; white below. Hind wings white. Abdomen golden-ochreous, first tergite and sternites white.

Genitalia ♂ (Fig. 81). Uncus narrow lateral margins nearly parallel, apex concave. Apex of gnathos long, narrow. Digitate processes of juxta with lateral margins nearly parallel, apex with few short setae dorsally. Valvae narrow, somewhat broadened basally or with lateral margins nearly parallel. Aedeagus slightly bent ventrad, ventral side of apex with two lateral, pointed projections; vesica with single, long, curved cornutus.

Genitalia ♀ (Fig. 75). Margin of ostium bursae expanded posteriorly, strongly concave at middle. Antrum wide, wrinkled anteriorly. Ductus bursae cylindrical, expanded progressively towards corpus bursae. Corpus bursae reniform. Signum a transverse, irregular plate, slightly constricted at middle.

REMARKS. T. xanthosoma can easily be distinguished from others species with an ochreous abdomen and white hind wings by the dark fuscous or black basal half of its fore wing costa and from venifurcata by the free veins R_4 and R_5 .

Duckworth (1966:197) synonymized amseli (= albella Amsel, nec albella Zeller) with xanthosoma and added Guatemala, Panama and Colombia to its distribution. After examining his material it was found that amseli is a good species and the specimens from Panama represented a subspecies of xanthosoma, described below as leucocephala. The material from Guatemala was not available for study.

DISTRIBUTION (Fig. 82). Colombia, French Guiana, Panama. Both subspecies appear to be restricted to the Tropical Moist Forest and Tropical Wet Forest.

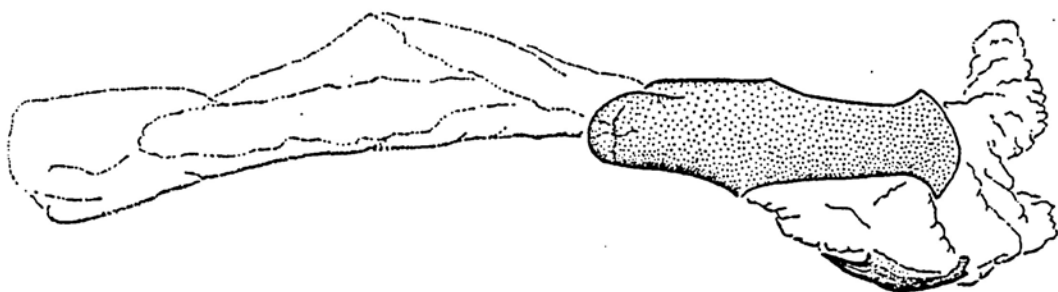
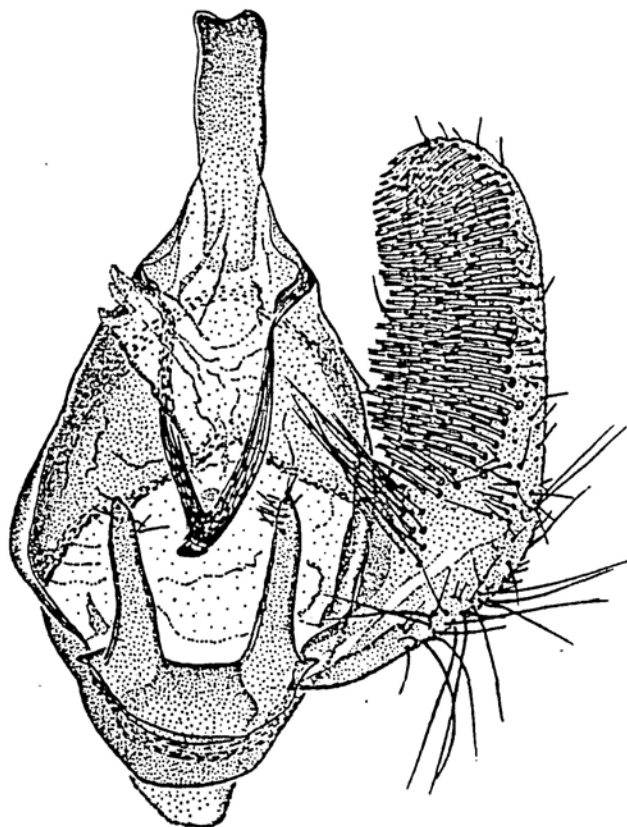


Fig. 81

Fig. 81 Genitalia of Timocratica xanthosoma leucocephala ssp. n., ♂, paratype, Panama (slide, Becker; NMNH, Washington).

Timocratica xanthosoma xanthosoma (Dognin)

(Figs 75, 82)

Stenoma xanthosoma Dognin, 1913, Annls Soc. ent. Belg.

57:416. Holotype ♂, FRENCH GUIANA: Guyanne, St. Laurent du Maroni (genitalia slide 2099, Duckworth; NMNH, Washington, no. 32362) [examined].

Stenoma sacra Meyrick, 1918, Exot. Microlepidopt. 2:209.

Holotype ♀, FRENCH GUIANA: Guyanne, R. Maroni, 1916 (Le Moult) (genitalia slide 5641, Clarke, BMNH) [examined]. [Synonymized by Meyrick, 1925:192].

Stenoma xanthosoma Dognin; Meyrick, 1925:192 [synonymy]; Busck, 1935:60 [catalogue].

Timocratica xanthosoma (Dognin); Clarke, 1955:392; pl. 196, figs 3-3c [adult, genitalia of holotype of sacra Meyrick].

♂ 10-14mm, ♀ 13-16mm. Vertex golden-yellow.

REMARKS. T. xanthosoma xanthosoma has the vertex golden-yellow, whereas in x. leucocephala it is white. The nominal subspecies is also smaller on average than the latter, and the white scales on the palpi, tarsi and antennae predominate over the black, making these appendages look lighter.

BIOLOGY. Unknown.

DISTRIBUTION. French Guiana.

MATERIAL STUDIED.

5 ex. (4 ♂, 1 ♀; 3 ♂, 1 ♀ genitalia preparations).

French Guiana: 4 ♂, 1 ♀, Guyanne, St. Jean du Maroni (Le Moult) (BMNH).

Timocratica xanthosoma leucocephala ssp. n.

(Figs 79, 81, 82)

Timocratica xanthosoma (Dognin), Duckworth, 1966:197
(partim) [synonymy].

♂ 14-17mm, ♀ 18mm. Vertex white. Antennae white mixed with black scales. Fore femora, fore and middle tibiae above, and tarsi black, with scattered white scales mainly on the middle and hind tarsi.

REMARKS. T. xanthosoma leucocephala is distinguished from the nominate subspecies by the white vertex. It is also larger on average and the black scales on the palpi, antennae and tarsi predominate over the white so that these appendages look darker.

BIOLOGY. Moths have been collected in February, April and May.

DISTRIBUTION (Fig. 82). Colombia and Panama.

MATERIAL EXAMINED.

7 ex. (6 ♂, 1 ♀; 3 ♂, 1 ♀ genitalia preparations).

Holotype ♂, Panama: Canal Zone, Barro Colorado Island, 5-10.iv.1965 (Duckworth) (NMNH, Washington, no. 76656).

Paratypes. Colombia: 1 ♂, [Bogota ?] (Nolken) (BMNH); 1 ♂, Chocó, Juntas, Rio San Juan, 100m ('400 ft'), 11.1909 (Palmer) (BMNH). Panama: 3 ♂, 1 ♀, Canal Zone, Barro Colorado Island, 10-28.iv.1964, 5-10.iv.1965 (Duckworth) (NMNH, Washington).

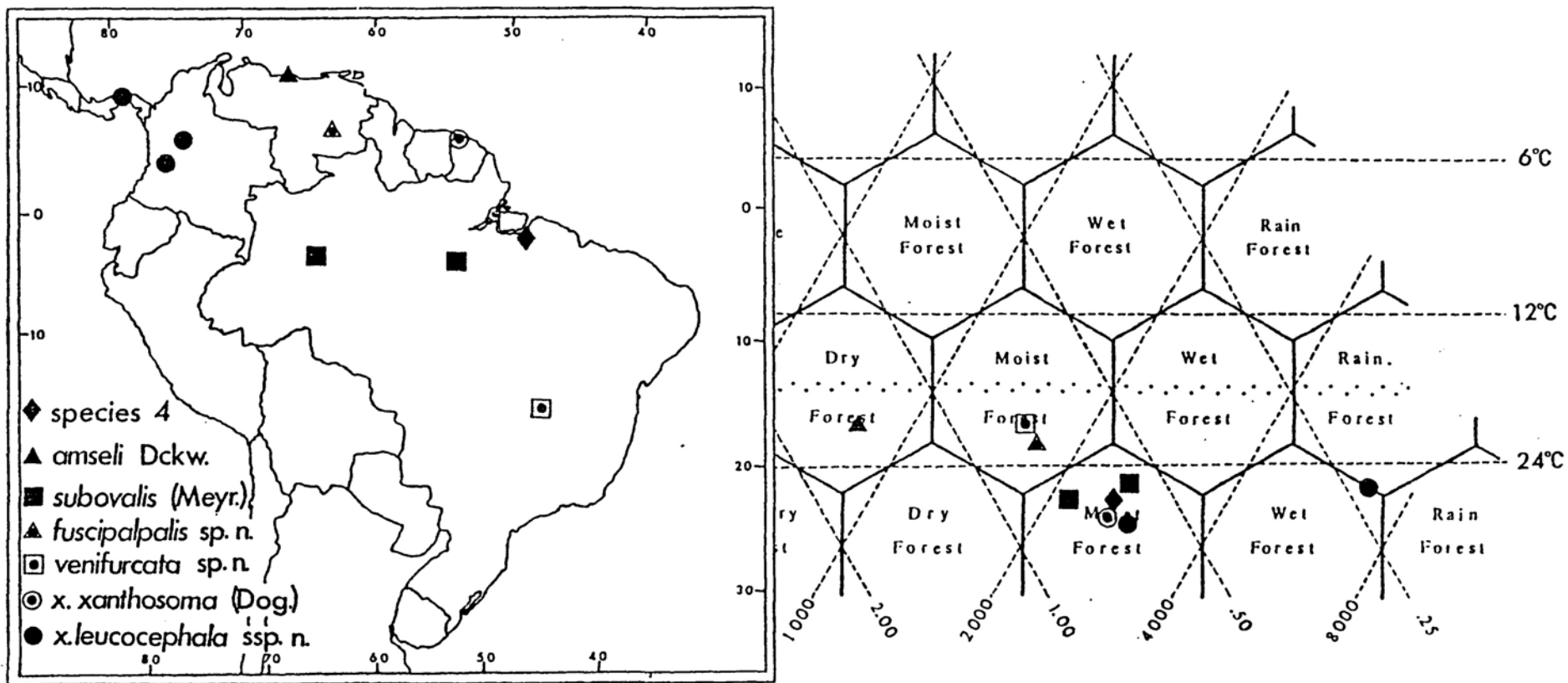


Fig. 82 Geographical and ecological distribution of the *xanthosoma*-complex of *Timocratica*.

The albella-complex

Except for parvifusca, all the species are as follows.
Hind wings plain white or tinged with golden-yellow.
Abdomen plain white or slightly tinged with yellow above.
T. parvifusca has wings dark fuscous.

Timocratica anelaea (Meyrick)

(Figs 83, 84, 90)

Stenoma anelaea Meyrick, 1932, Exot. Microlepidopt. 4:305.

Holotype ♂, BRAZIL: Amazonas, Ponte Nova, Rio Xingu

(genitalia slide, Busck; NMNH, Washington) [examined].Timocratica anelaea (Meyrick); Busck, 1935:16 [catalogue].

♂ 25-26mm. Frons white, edged with golden-yellow. Second segment of labial palpi ochreous, basal half above dark grey; third segment black. Antennae white. Fore coxae and tibiae above with dark grey scales, fore and middle tarsi black. Fore wings elongate, costa gently arched, apex angled, termen and tornus oblique-rounded; veins free; white below. Hind wings white. Abdomen golden-ochreous with white transverse bands on articulations, first tergite, anal tuft and sternites white.

Genitalia ♂ (Fig. 83). Uncus with lateral margins nearly parallel, apex strongly concave. Apex of gnathos broad, triangular. Digitate processes of juxta long, broadened basally, progressively narrowed towards apex; apex pointed, distal half above with long setae, few setae on ventral side. Lateral margins of valvae evenly rounded, nearly parallel, somewhat convergent from distal third to apex. Aedeagus bent ventrad at base, vesica with strong elongate, bent cornutus and many minute spines.

REMARKS. T. anelaea is the only species in the group with an ochreous abdomen transversely banded with white on the articulations.

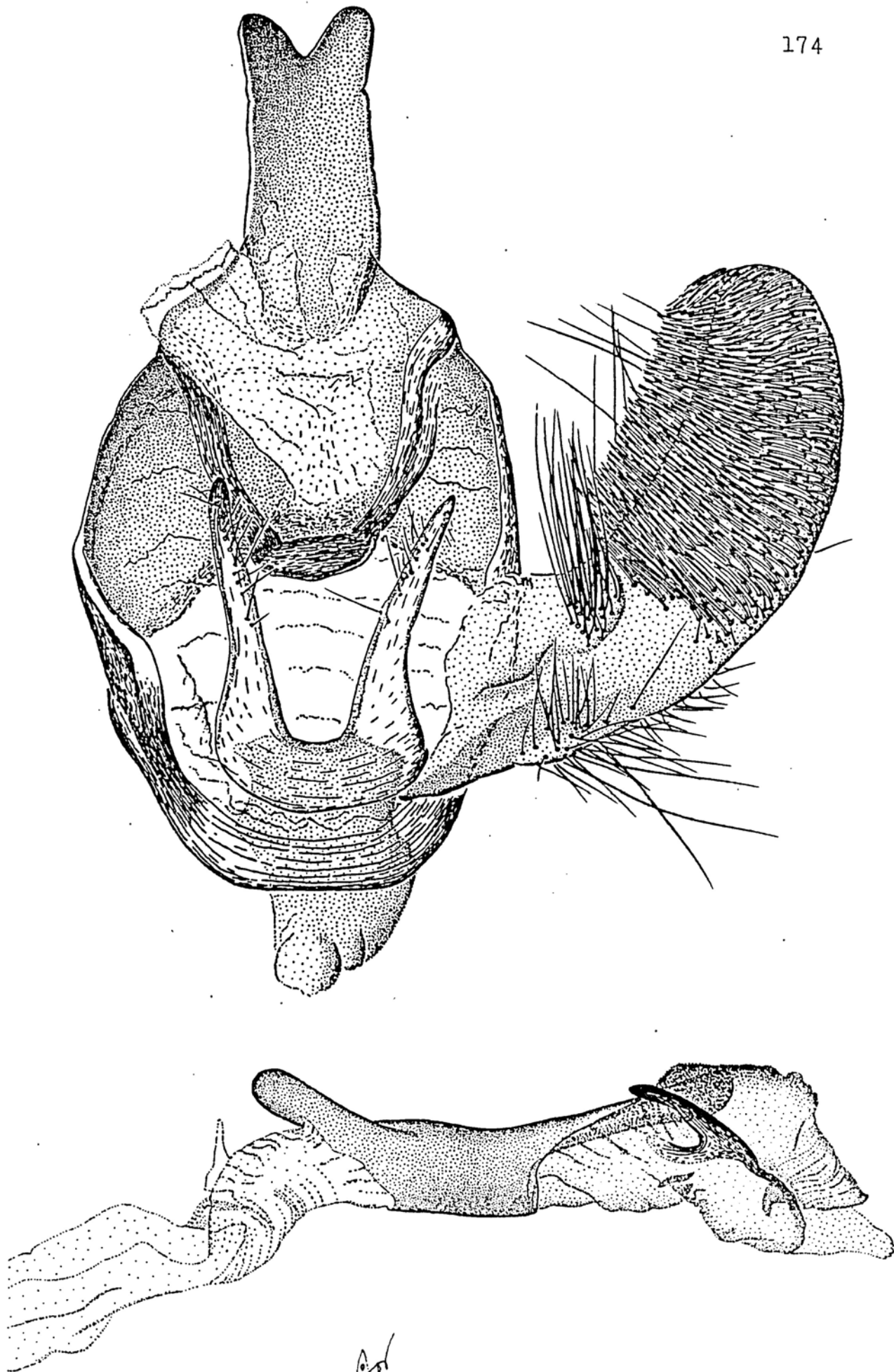


Fig. 83 Genitalia of Timocratica anealaea (Meyrick), ♂, Brazil (slide no. 20984).



Fig. 84 Timocratica anelaea (Meyrick), ♂, Brazil (BMNH).



Fig. 85 Timocratica titanoleuca sp. n., holotype ♂,
Peru (BMNH).

BIOLOGY. Unknown.

DISTRIBUTION (Fig. 90). Brazil (Amazon Basin). Both localities are in the Tropical Moist Forest.

MATERIAL EXAMINED.

2 ♂ (1 ♂ genitalia preparation).

Brazil: 2 ♂, Pará, Belém ('Pará') (Moss) (BMNH).

Timocratica titanoleuca sp. n.

(Figs 85, 86, 90)

♂ 27-28mm. Frons white, edged with fuscous. Second segment of labial palpi dark fuscous below and externally, white internally and near distal articulation; third segment white basally, dark fuscous towards apex. Antennae white. Fore coxae above, middle and hind tarsi golden-ochreous; fore tibiae and tarsi white above, dark fuscous below. Wings below golden-ochreous above cell and on veins, fore wings with costa gently arched; apex angled, somewhat pointed; termen straight, oblique; tornus rounded; veins free. Abdomen white, somewhat tinged with cream above.

Genitalia ♂ (Fig. 86). Uncus with lateral margins nearly parallel, basal third slightly broadened, apex strongly concave. Apex of gnathos narrow, pointed, strongly sclerotized. Digitate processes of juxta broadened basally, narrowing progressively towards apex, distal half dorsally with row of long setae. Ventral margins of valvae evenly rounded, dorsal margin nearly straight. Aedeagus slightly bent ventrad at middle, vesica with strong bent cornutus and many spines of different sizes opposite.

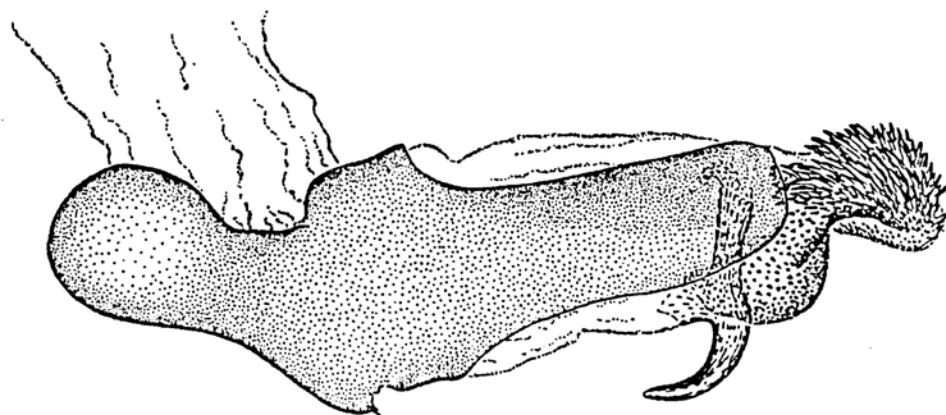
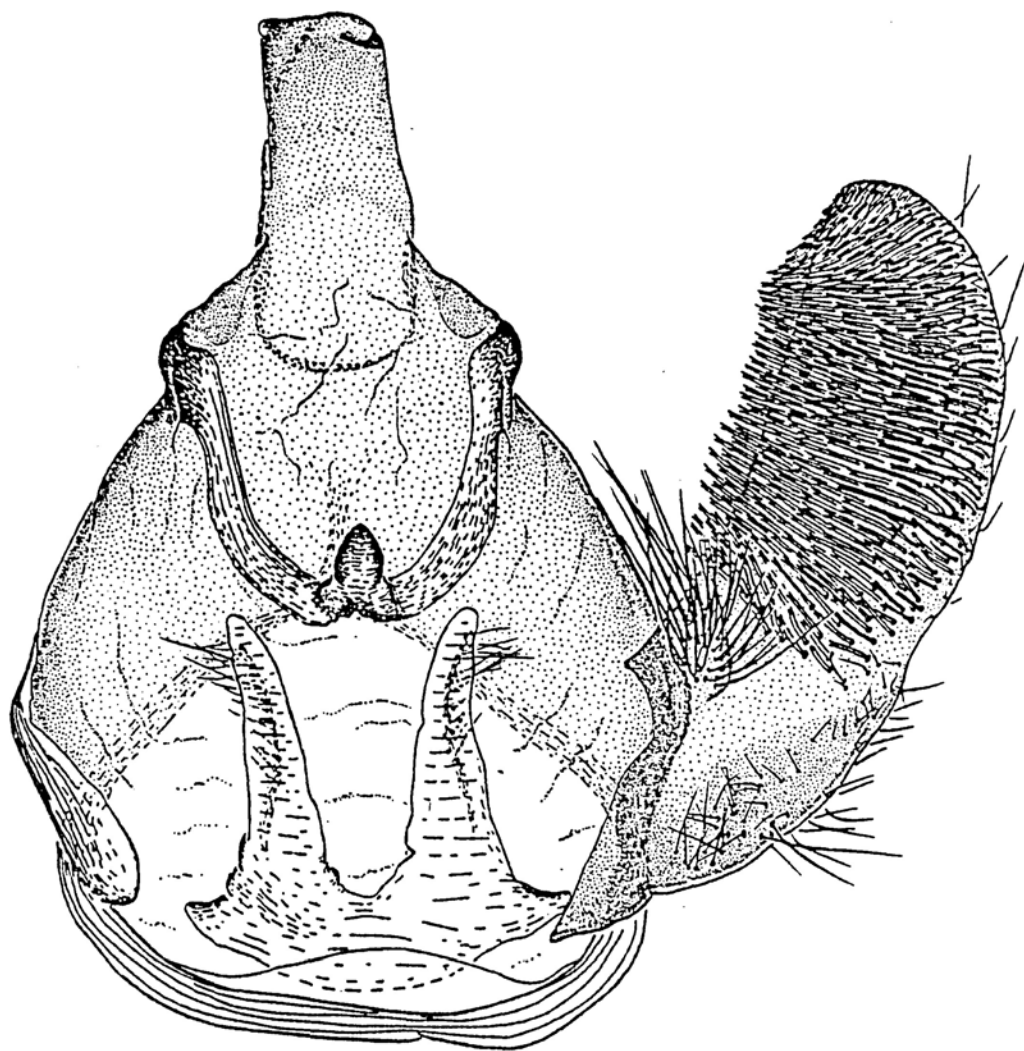


Fig. 86 Genitalia of *Timocratica titanoleuca* sp. n., ♂, paratype, Peru (slide no. 2006, Duckworth; NMNH, Washington).

REMARKS. T. titanoleuca is very similar externally to macroleuca and leucorectis but easily distinguished by the absence of ochreous colouring on its labial palpi.

BIOLOGY. Moths have been collected in September and November.

DISTRIBUTION (Fig. 90). Peru (Eastern side of Andes). Both localities are in the Tropical Premontane Wet Forest.

MATERIAL EXAMINED.

2 ♂ (2 ♂ genitalia preparations).

Holotype ♂, Peru: Puno, La Oroya, R. Inambari, Carabaya, 1000m ('3100 ft'), ix.1905 (Ockenden) (genitalia slide 20985, Becker; BMNH)

Paratype ♂, Peru: Huánuco, Tingo Maria, 2.xi.1949 (Allard) (NMNH, Washington).

Timocratica macroleuca (Meyrick)

(Figs 87, 88, 90)

Stenoma macroleuca Meyrick, 1932, Exot. microlepidopt. 4:304.

Holotype ♂, BOLIVIA: La Paz, Rio Songo (Fassl) (genitalia slide, Busck; NMNH, Washington) [examined].

Timocratica macroleuca (Meyrick); Busck, 1935:17 [catalogue].

♂ 27-30mm. Frons white, edged with fuscous. Second segment of labial palpi white, basal half ochreous below, dark grey above; third segment white, with few black scales on apex. Antennae white. Fore coxae and tibiae ochreous above; fore tarsi white above, dark fuscous below; middle and hind tarsi

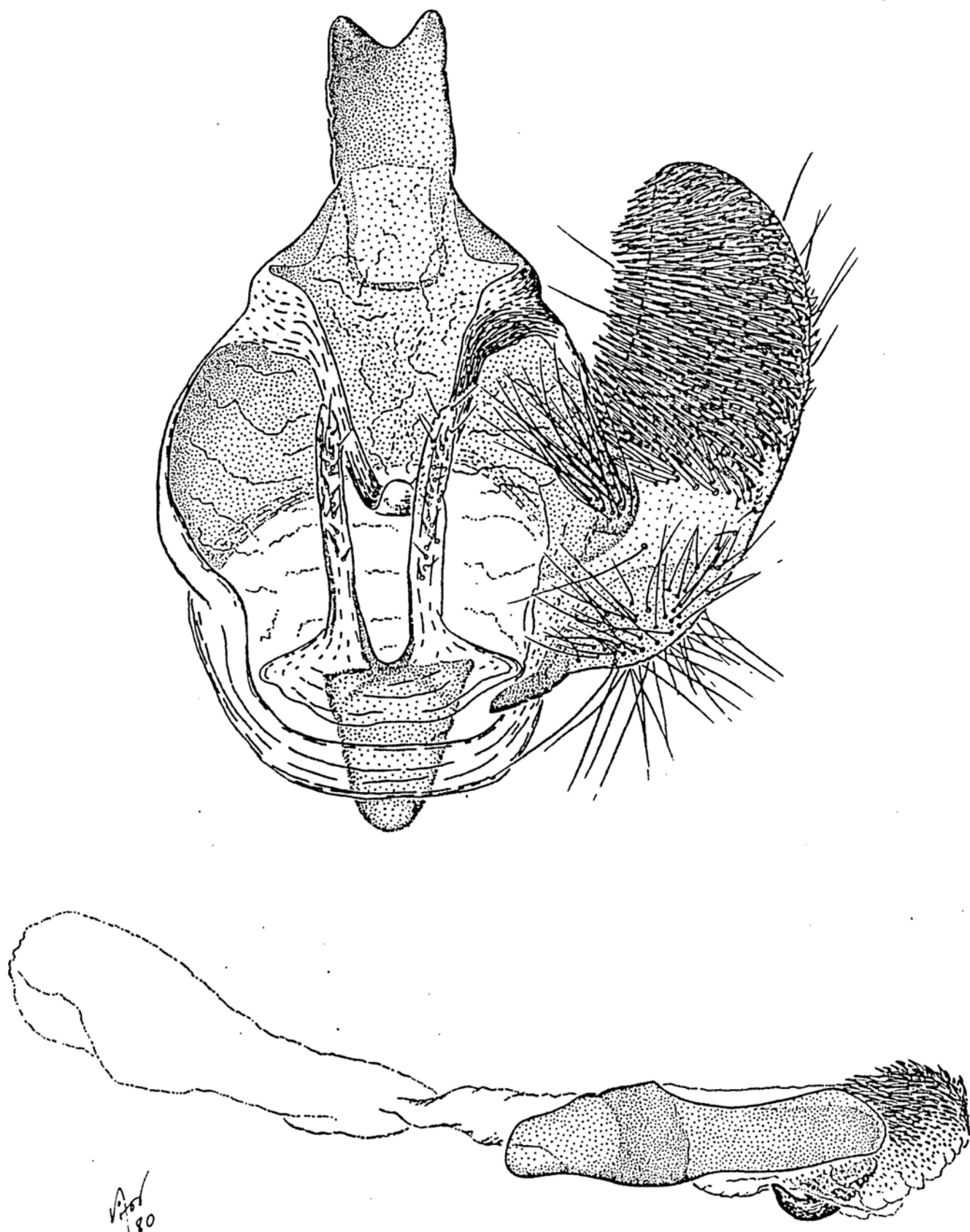


Fig. 87 Genitalia of Timocratica macroleuca (Meyrick),
♂, Bolivia (slide no. 20995; BMNH).

golden-ochreous. Fore wings with costa gently arched; apex angled, somewhat pointed; termen straight, oblique; tornus rounded; veins free; underside golden-yellow, deep golden-yellow along costa and veins. Hind wings below golden-yellow along costa and on veins. Abdomen tinged with golden-yellow above, progressively white towards base, white below.

Genitalia ♂ (Fig. 87). Uncus with lateral margins nearly parallel, somewhat broadened at basal two-thirds, apex concave. Apex of gnathos short, strongly sclerotized, rounded. Digitate processes of juxta very long, narrow, distal two-thirds with sparse setae. Lateral margins of valvae evenly rounded, nearly parallel. Aedeagus nearly straight, vesica with strong bent cornutus and many spines of different sizes.

REMARKS. T. macroleuca is very similar externally to leucorectis and titanoleuca but can easily be distinguished from titanoleuca by the ochreous tinge of the second segment of its labial palpi and from leucorectis by the fore tarsi which are white above.

BIOLOGY. Unknown.

DISTRIBUTION (Fig. 90). Bolivia (Eastern slopes of the Andes). The type-locality is in the Subtropical moist forest, transition to Tropical Premontane moist forest.

MATERIAL EXAMINED.

1 ♂ (1 ♂ genitalia preparation).

Bolivia: 1 ♂, La Paz, Rio Songo, 750m (Fassl) (BMNH).



Fig. 88 Timocratica macroleuca (Meyrick), ♂, Bolivia
(BMNH).

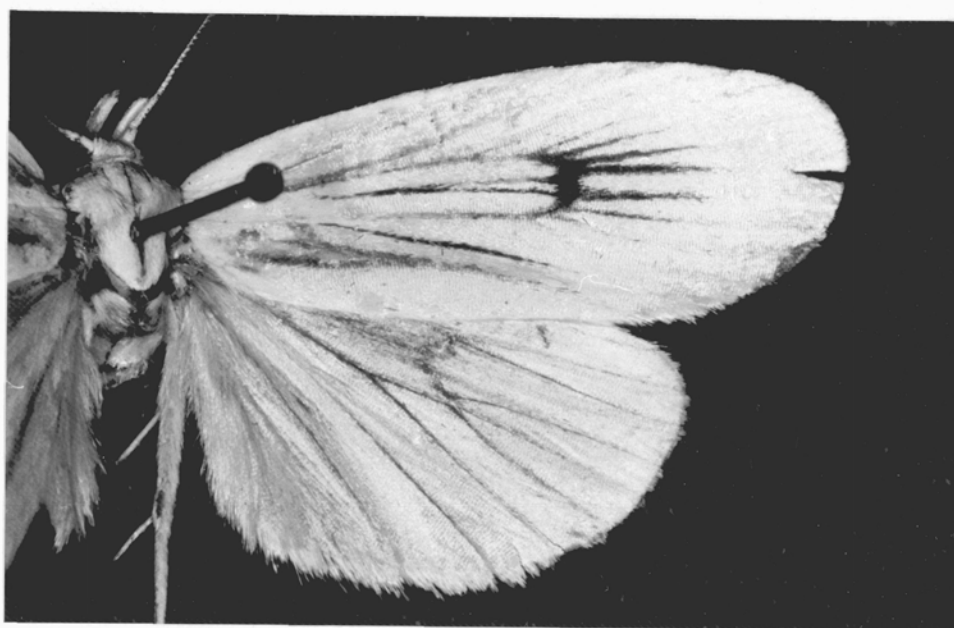


Fig. 89 Timocratica melanostriga sp. n., ♀, holotype,
Brazil (NMNH, Washington).

Timocratica species 5

(Figs 90, 92)

♀ 17mm. Frons white, edged with fuscous. Second segment of labial palpi golden-yellow, basal half above tinged with dark fuscous; third segment fuscous internally, white externally. Fore femora golden-yellow; basal half of fore tibiae above ochreous, distal half, and tarsi dark fuscous; middle legs and hind tarsi tinged with golden-yellow. Fore wings with costa evenly arched; apex, termen and tornus rounded; veins free; underiside golden-yellow above cell, tinged with fuscous along apex and termen. Hind wings white, underside golden-yellow above cell. Abdomen white.

Genitalia ♀ (Fig. 92). Lamella antevaginalis expanded posteriorly as two lobes. Antrum very broad posteriorly, anterior half funnel-shaped, wrinkled longitudinally. Ductus bursae broadening progressively towards corpus bursae. Corpus bursae pear-shaped. Signum an irregular plate, strongly constricted at middle.

REMARKS. This species is very similar externally to spinignatha but is smaller, and lacks the fuscous tinge on the fore femora.

BIOLOGY. Unknown.

DISTRIBUTION (Fig. 90). Peru (Eastern side of the Andes), in the Tropical Moist Forest.

MATERIAL EXAMINED.

Peru: 1♀, San Martin, Tarapoto (de Mathan) (BMNH).

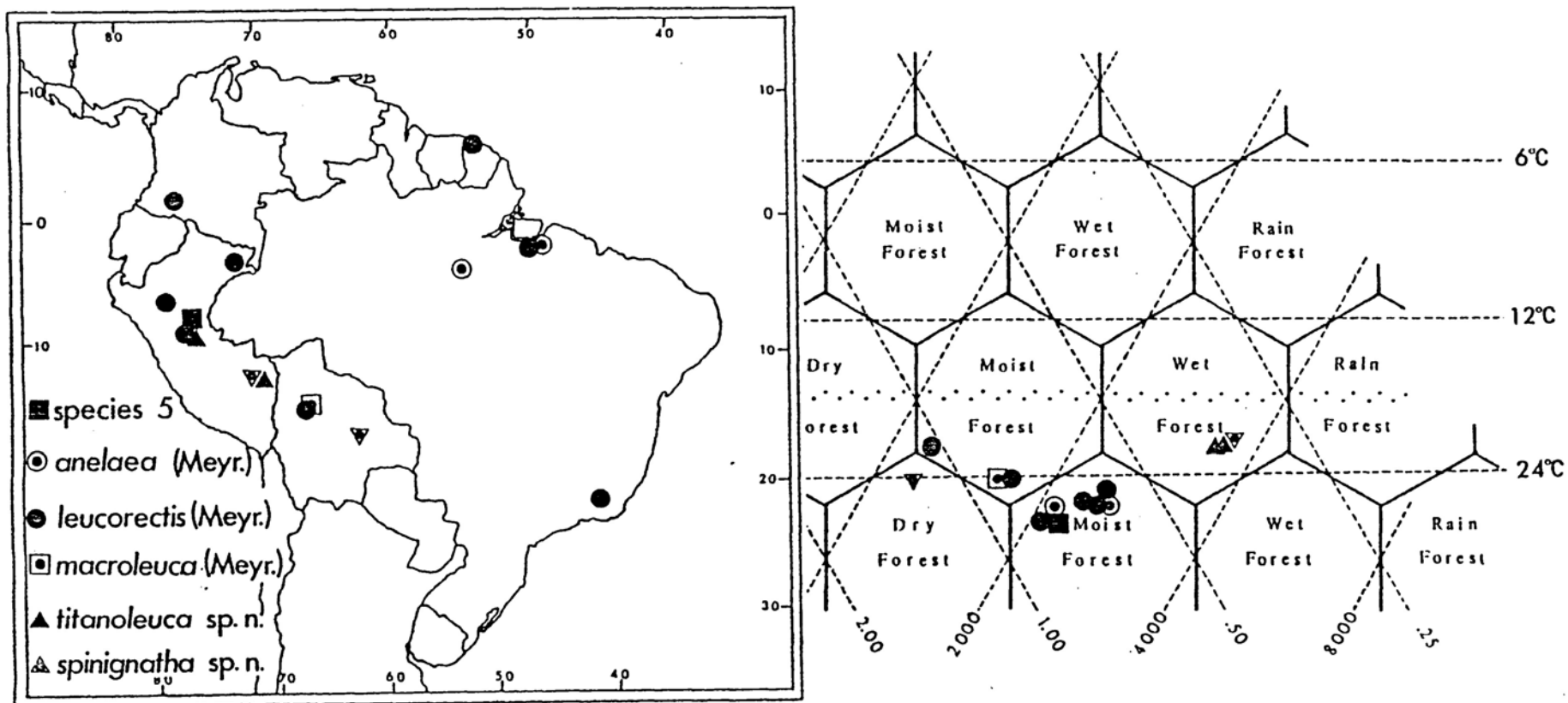


Fig. 90 Geographical and ecological distribution of the albella-complex of Timocratica.

Timocratica leucorectis (Meyrick)

(Figs 90, 91, 93)

Stenoma leucorectis Meyrick, 1925, Exot. Microlepidopt. 3:223.

Lectotype ♂, BRAZIL: Minas Gerais, Leopoldina, 1924

(genitalia slide 5492, Clarke; BMNH), designated by

Clarke (1955:388) [examined].

Timocratica leucorectis (Meyrick); Busck, 1935:17 [catalogue];

Clarke, 1955:388; pl. 194, figs 4, 4b [adult, genitalia].

♂ 28-30mm, ♀ 30-32mm. Frons white, edged with fuscous in some specimens. Second segment of labial palpi ochreous below, basal half above dark grey, distal half above and internally white; third segment progressively black from basal third to apex. Antennae white. Distal half of fore tibiae above, and fore tarsi dark fuscous, middle and hind tarsi golden-yellow. Fore wings with costa gently arched, apex angled, somewhat pointed; termen straight, oblique; tornus rounded; veins free; underside of wings above cell golden-yellow, some specimens tinged with fuscous along apex and termen. Abdomen white.

Genitalia ♂ (Fig. 91). Uncus with lateral margins nearly parallel, slightly constricted at basal third, apex strongly concave. Gnathos very long, lateral arms nearly parallel from basal third towards apex, two digitate posteriorly-directed processes at basal third; apex rounded, strongly sclerotized. Digitate processes of juxta very long; distal half somewhat bent outwards, with long setae. Lateral margins of valvae nearly parallel, distal half of ventral margin evenly rounded. Aedeagus curved ventrad, vesica with strong cornutus and several spines.

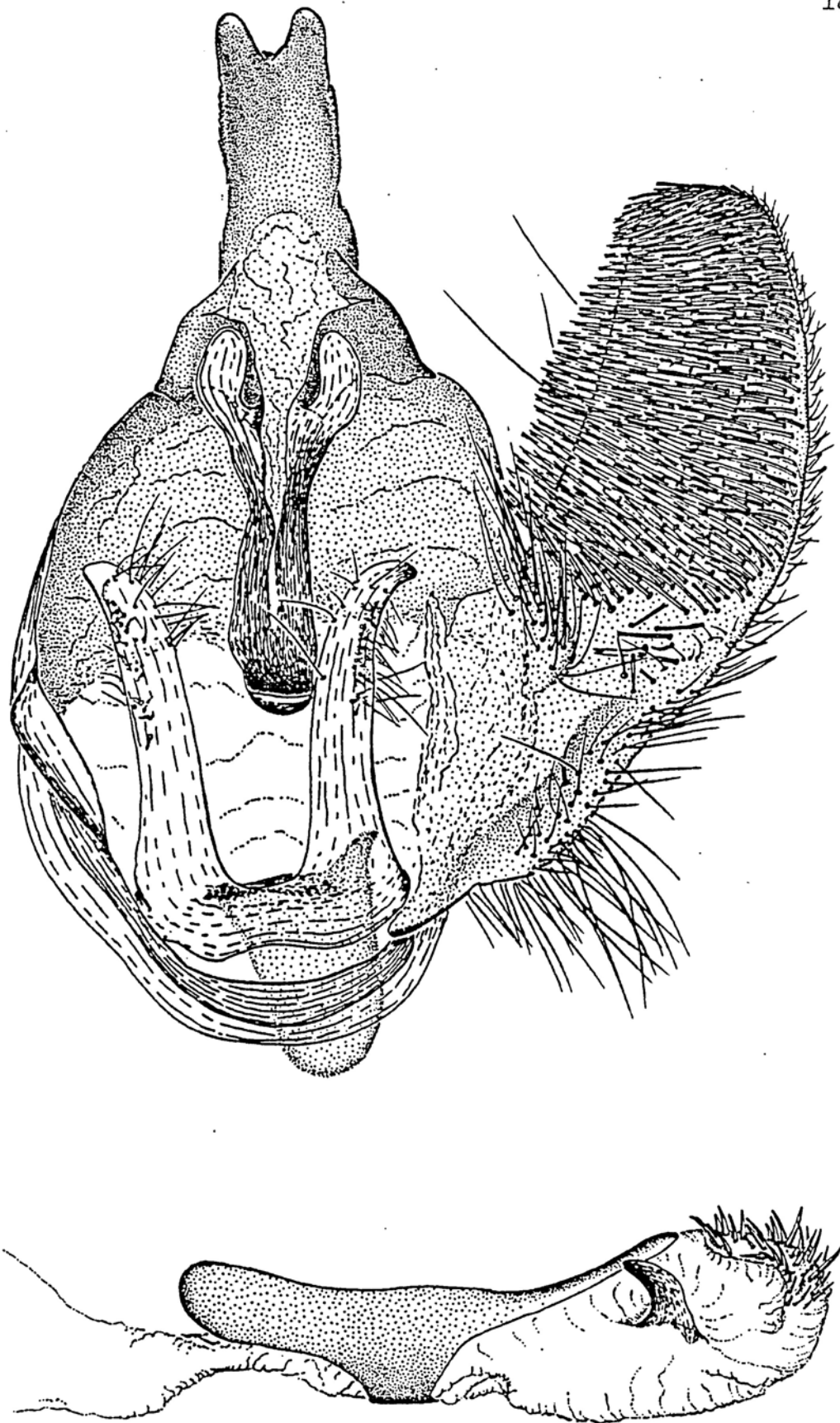


Fig. 91 Genitalia of Timocratica leucorectis (Meyrick),
 ♂, Peru (slide no. 20996; BMNH).

Genitalia ♀ (Fig. 93). Lamella antevaginalis as two broad, triangular lobes. Ostium bursae wide, margin nearly straight. Antrum bent at middle, anterior half with a few longitudinal wrinkles. Ductus bursae twisted posteriorly, wrinkled longitudinally. Corpus bursae nearly globular, walls, as in ductus bursae, densely scobinated. Signum a nearly circular, diffuse plate.

REMARKS. T. leucorectis is one of the largest species in the group, very similar externally to titanoleuca and macroleuca. It can easily be distinguished from the former by the ochreous underside of the labial palpi and from the latter by the fuscous fore tarsi. The base of the gnathos arms are modified as in spinignatha and constrictivalva but in leucorectis the digitate processes are directed posteriorly.

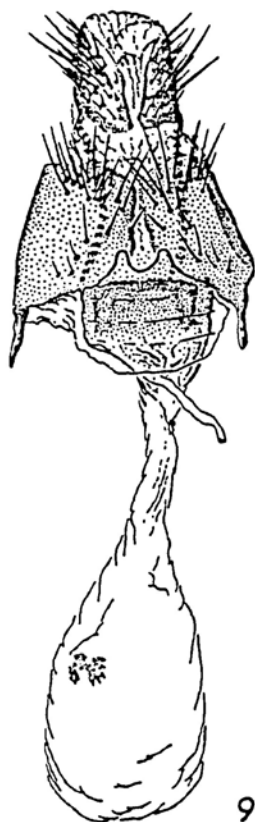
BIOLOGY. Moths have been collected in July and August.

DISTRIBUTION (Fig. 90). Brazil, Bolivia, Colombia, French Guiana and Peru. Despite its wide geographic distribution this species appears to be confined to only two Life Zones, the Subtropical Moist forest and the Tropical Moist Forest.

MATERIAL EXAMINED.

8 ex. (6 ♂, 2 ♀; 3 ♂, 1 ♀ genitalia preparations).

Bolivia: 2 ♂, La Paz, Rio Songo (Fassl) (BMNH). Brazil: Pará, Belém ('Pará'), vii.1919 (Parish) (NMNH, Washington) (paralectotype ♂). Colombia: 1 ♂, Putumayo, Mocoa (Hopp) (MNHU, Berlin). French Guiana: 1 ♂, Guyanne, Maroni River, 60m, viii.1904 (Schaus) (NMNH, Washington). Peru: 1 ♂, San Martin, Moyobamba (de Mathan) (BMNH); 1 ♀, Loreto, Pebas (de Mathan) (BMNH); 1 ♀, San Martin, Huállaga, Chambirayacu (de Mathan) (BMNH).



92



93

Figs 92-93 Genitalia of Timocratica ♀. 92, T. species 5, Peru (slide no. 21215; BMNH). 93, T. leucorectis (Meyrick), Peru (slide no. 21216; BMNH).

Timocratica spinignatha sp. n.

(Figs 90, 94)

♂ 19-23mm, ♀ 23mm. Frons white, edged with fuscous. Second segment of labial palpi ochreous below, dark fuscous above except distal quarter, distal quarter above white; third segment white, apical third dark fuscous. Fore coxae golden-yellow, femora ochreous, basal half above dark fuscous; tarsi and distal half of tibiae dark fuscous; middle femora and tibiae tinged externally with golden-ochreous, middle and hind tarsi golden-ochreous. Fore wings with costa gently arched, apex angled, termen and tornus rounded; veins free; underside golden-ochreous above cell and on veins, tinged with fuscous along apex and termen. Hind wings golden-ochreous below above cell and on veins. Abdomen tinged with cream above, white below.

Genitalia ♂ (Fig. 94). Uncus constricted at middle, apex bifurcated. Gnathos arms expanded ventrad at base, densely covered with minute spines, apex short, rounded. Digitate processes of juxta long, slender, lateral margins nearly parallel, with sparse long setae mainly along dorsal side. Valvae with dorsal margin straight except at base, ventral margin evenly rounded. Aedeagus bent ventrad at basal third, vesica with bent cornutus and many spines of different sizes.

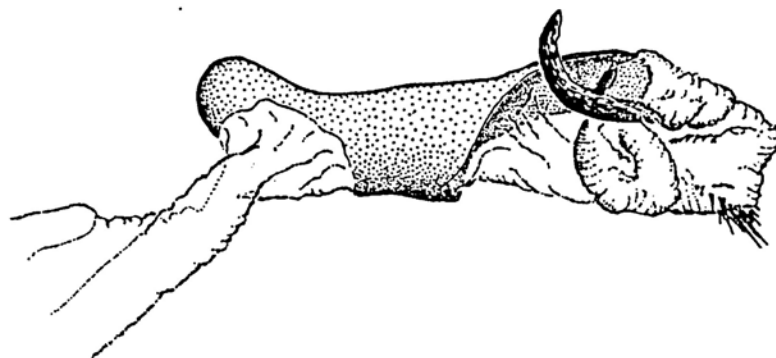
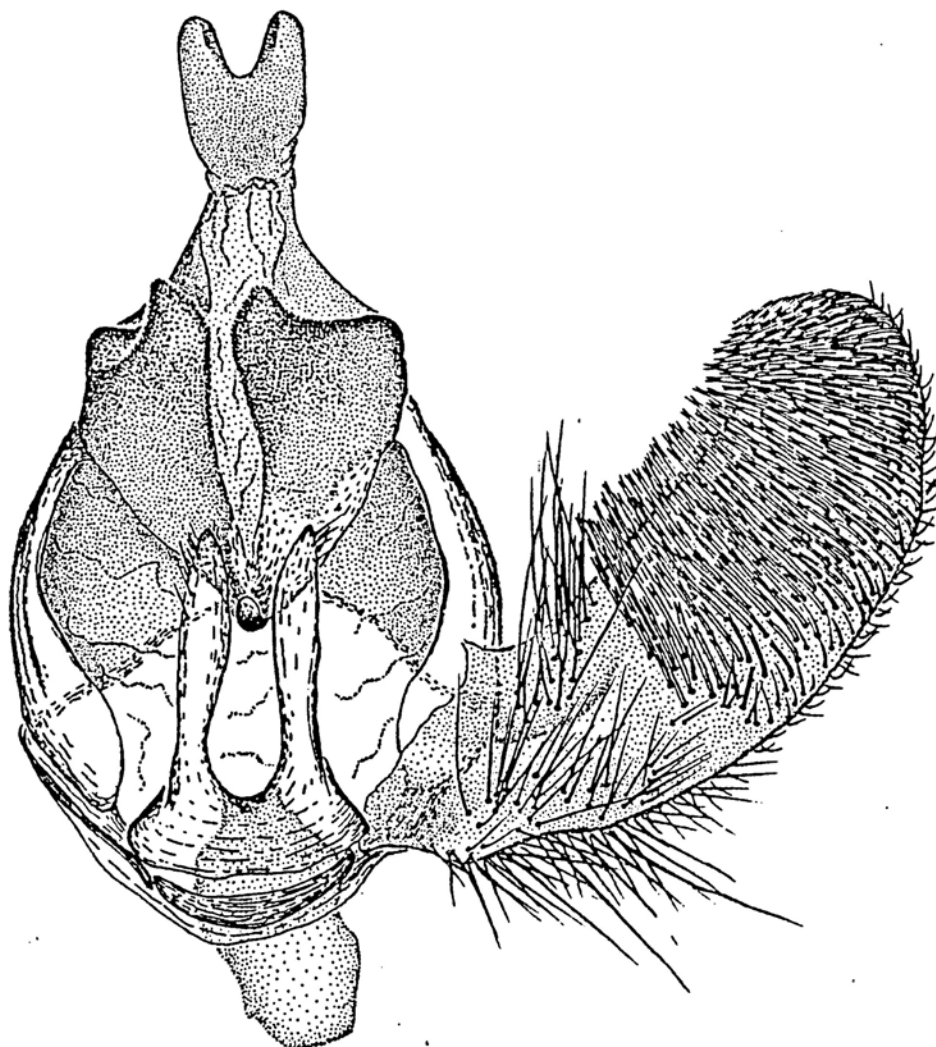


Fig. 94 Genitalia of *Timocratica spinignatha* sp. n., ♂, holotype, Peru (slide no. 21024; BMNH).

REMARKS. T. spinignatha is similar externally to leucorectis, macroleuca and titanoleuca but smaller. It differs externally from macroleuca and titanoleuca by the dark fuscous fore tarsi and from leucorectis by the dark fuscous tinge on the fore femora. The modification of the gnathos makes the male genitalia very distinctive among others in the genus.

BIOLOGY. Moths have been collected in March.

DISTRIBUTION (Fig. 90). Peru. The type series of this species was collected in the Tropical Premontane Wet Forest.

MATERIAL EXAMINED.

4 ♂ (2 ♂ genitalia preparations).

Holotype ♂, Peru: Puno, La Oroya, R. Inambari, 1000m ('3100 ft'), iii.1905 (Ockenden) (BMNH).

Paratypes. Peru: Puno, 3 ♂, La Oroya, R. Inambari, 1000m ('3100 ft'), iii. 1905 (Ockenden) (BMNH).

Timocratica argonais (Meyrick)

(Figs 95, 101, 125)

Stenoma argonais Meyrick, 1925, Exot. Microlepidopt. 3:224.Holotype ♀, BRAZIL: Amazonas, Fonte Boa, ii.1920 (Parish)
(genitalia slide 5497, Clarke; BMNH) [examined].[Stenoma maturescens Meyrick, 1925:223 (partim).

Misidentification].

Timocratica argonais (Meyrick); Busck, 1935:16 [catalogue].Timocratica argonias Clarke, 1955:387; pl. 193, figs 1-1c.

Incorrect subsequent spelling.

♂ 20-23mm, ♀ 20-25mm. Head white, frons edged with fuscous. Second segment of labial palpi ochreous below, basal two-thirds above dark grey, distal third above and internally white; distal half of third segment progressively fuscous towards apex. Fore coxae and femora above, and tarsi dark fuscous; middle coxae and femora tinged with golden-ochreous externally, tarsi ochreous; hind tibiae tinged with golden-yellow externally, tarsi golden-yellow, Fore wings with costa gently arched, apex rounded, somewhat angled; termen and tornus oblique-rounded; veins free; golden ochreous below, slightly tinged with fuscous along apex and termen. Hind wings above cell golden-yellow. Abdomen white.

Genitalia ♂ (Fig. 95). Uncus with lateral margins nearly parallel, apex strongly concave. Apex of gnathos long and narrow. Digitate processes of juxta broadened basally, narrowing progressively towards apex, distal half with sparse setae above. Ventral margin of valvae evenly rounded, dorsal margin straight except at base. Aedeagus somewhat curved ventrad, vesica with strong, curved cornutus and many acute-pointed spines of different sizes.

Genitalia ♀ (Fig. 125). Margin of ostium bursae straight. Antrum long with some longitudinal wrinkles, strongly bent at connection with ductus bursae. Ductus bursae broadening progressively towards corpus bursae, walls slightly wrinkled. Corpus bursae oblong, walls plain and smooth. Signum an elongate plate weakly sclerotized and smooth along middle.

REMARKS. T. argonais is very similar externally to maturescens, megaleuca and palpalis. However, it can easily be distinguished externally from the first by the white inner surface of the labial palpi and from the others by the fuscous tinge along the apex and termen on the underside of the fore wings. The large series from French Guiana and Guyana agrees well with the lectotype of T. argonais but their conspecificity should be confirmed by males from the type-locality.

BIOLOGY. Moths have been collected from March to October.

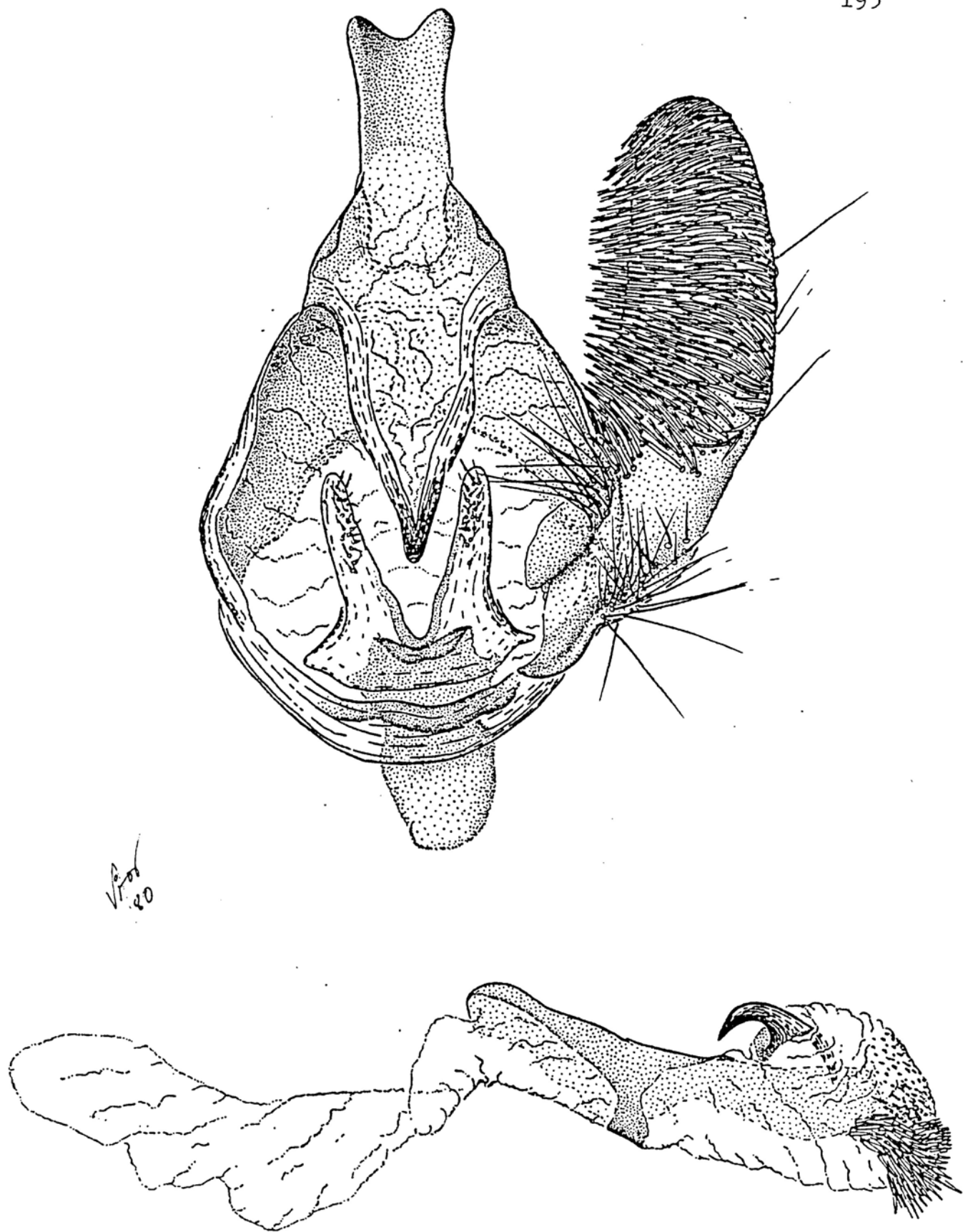


Fig. 95 Genitalia of Timocratica argonais (Meyrick), ♂, French Guiana (slide no. 20998; BMNH).

DISTRIBUTION (Fig. 101). Brazil, French Guiana and Guyana. All the collecting localities of this species are in the Tropical Moist Forest.

MATERIAL EXAMINED.

51 ex. (37 ♂, 14 ♀; 2 ♂, 3 ♀ genitalia preparations).

Brazil: 1 ♀, Amazonas, Fonte Boa, vii.1906 (Klages) (BMNH). French Guiana: 6 ♂, 1 ♀, Guyanne, R. Maroni (Le Mout) (BMNH; NMNH, Washington) (paralectotypes of maturescens); 29 ♂, 10 ♀, Guyanne, Nouveaux Chantier, i-x (Le Mout) (BMNH); 1 ♂, Guyanne, St. Jean du Maroni (Le Mout) (BMNH). Guiana: 1 ♀, Berbice, New River, 250m ('750 ft'), 20.i-23.iii.1938 (Hudson) (BMNH).

Timocratica maturescens (Meyrick)

(Figs 96, 101)

Stenoma maturescens Meyrick, 1925, Exot. Microlepidopt.

3:223. Lectotype ♂, FRENCH GUIANA: Guyanne, R. Maroni 1916 (Le Mout) (genitalia slide 5796, Clarke; BMNH), designated by Clarke (1955:391) [examined].

Timocratica maturescens (Meyrick); Busck, 1935:17

[catalogue]; Clarke, 1955:391; pl. 195, figs 1-1b [adult, genitalia].

♂ 20-22mm. Head white, frons edged with fuscous. Second segment of labial palpi ochreous, basal third above tinged with dark grey; third segment white with some fuscous scales on apex. Fore coxae and femora above, and tarsi dark fuscous; fore coxae and femora below, and middle and hind tarsi ochreous. Fore wings with costa gently arched, apex angled, termen and tornus rounded; veins free; underside ochreous above cell, white or tinged with fuscous along apex and termen. Hind wings below ochreous above cell. Abdomen white.

Genitalia ♂ (Fig. 96). Uncus with lateral margins nearly parallel, slightly broader basally, apex strongly concave. Apex of gnathos broad, rounded. Digitate processes of juxta long, lateral margins nearly parallel, with sparse long setae mainly along dorsal distal two-thirds. Ventral margin of valvae evenly rounded, dorsal margin nearly straight. Aedeagus nearly straight, vesica with strong, curved cornutus and many acute-pointed spines of different sizes.

REMARKS. T. maturescens is very similar externally to argonais and palpalis but can easily be distinguished by the lack of white on the second segment of the labial palpi. Meyrick described this species from a series of

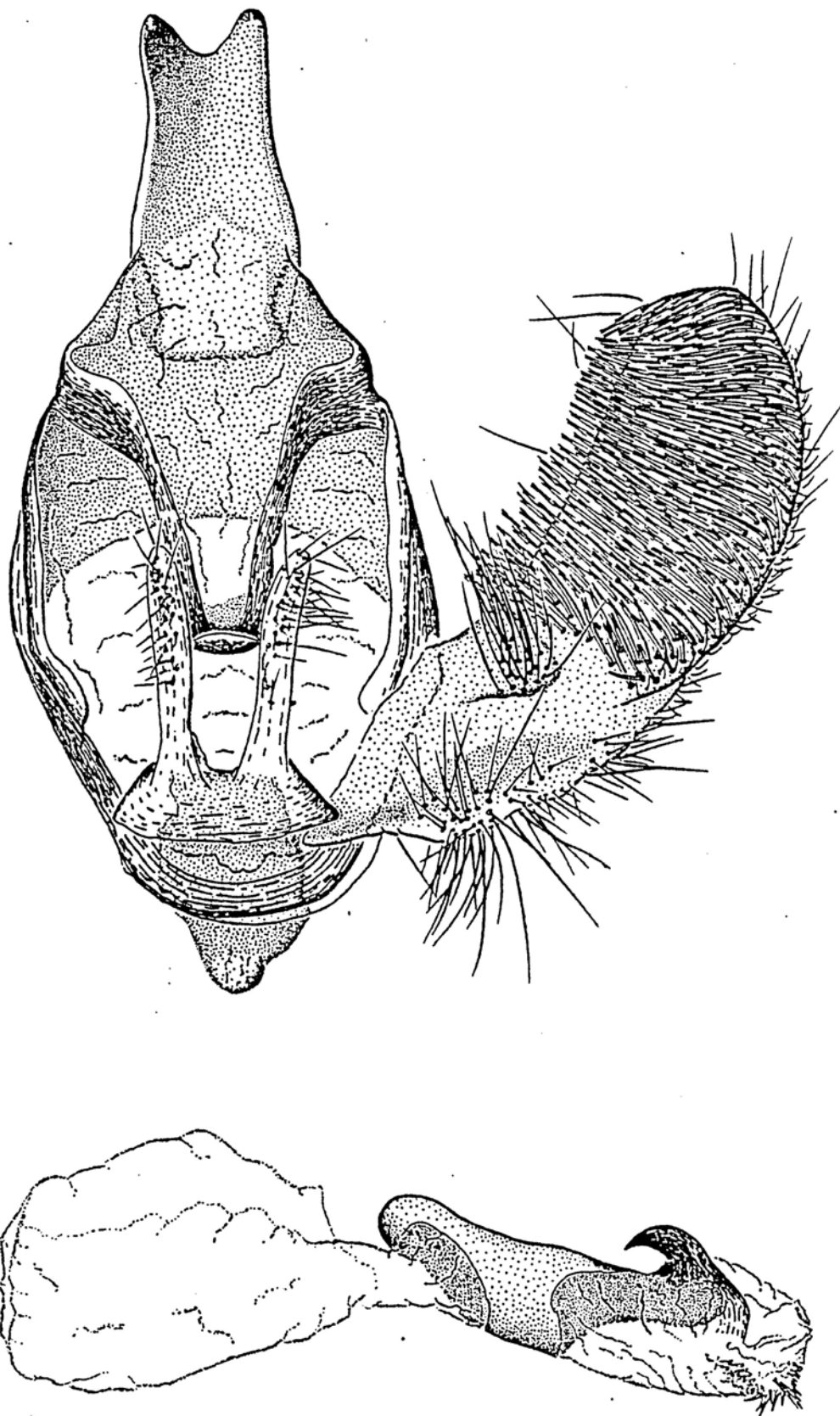


Fig. 96 Genitalia of Timocratica maturescens (Meyrick), ♂, Colombia (slide no. 20987; BMNH).

ten specimens, of which only nine were traced, eight in the BMNH and one in the NMNH, Washington. Only one of these is conspecific with the lectotype of maturescens, the other seven belong to argonais.

BIOLOGY. One of the specimens was collected in November, in French Guiana.

DISTRIBUTION (Fig. 101). French Guiana, Colombia and Venezuela, in the Tropical Moist Forest and Tropical Premontane Wet Forest.

MATERIAL EXAMINED.

6 ♂, 1 ♀ (2 ♂, 1 ♀ genitalia preparations).

French Guiana: Guyanne, R. Maroni (Le Moult) (BMNH). (paralectotype ♂); 1 ♂, Guyanne, St. Laurent, R. Maroni, 16.xi.1906 (Le Moult) (BMNH). Colombia: 2 ♂, Cundinamarca, Medina (Fassl) (BMNH); 1 ♂, Guainia, Rio Negro ('Ost Colomb.'), 800m (Fassl) (BMNH). Venezuela: 1 ♀, Amazonas, San Carlos de Rio Negro, 125m, 19-31.viii.1976 (Salcedo & Fernández) (UCV, Venezuela); 1 ♂, Bolívar, Rio Guaniamo, 160m, 25-28.v.1979 (Clavijo, Chacón & Fernández) (UCV, Venezuela).

Timocratica species 6

(Figs 97, 126)

♀ 23-27mm. Frons white, edged with fuscous. Second segment of labial palpi ochreous below, basal half above dark fuscous, distal half above and internally white; third segment white, fuscous towards apex. Antennae fuscous, except white scape and base of flagellum. Fore femora above, distal half of tibiae above and fore tarsi dark fuscous; fore coxae below, middle and hind tarsi golden-yellow. Fore wings with costa gently arched, apex angled, termen and tornus rounded; veins free; underside golden-yellow, fuscous along apex and termen. Hind wings tinged with golden-yellow along costa and termen. Abdomen white.

Genitalia ♀ (Fig. 97). Margin of ostium bursae slightly concave. Antrum long, posterior third funnel-shaped, anterior two-thirds strongly wrinkled longitudinally, bent at connection with ductus seminalis. Ductus bursae broadening progressively towards corpus bursae. Corpus bursae oblong, walls slightly wrinkled longitudinally as in ductus bursae. Signum an elongate plate without spines along middle.

REMARKS. T. species 6 is very similar to argonais but can easily be distinguished by the hind wings which are tinged with yellow above, along costa and termen, and by the narrow antrum of the female genitalia. Although the female genitalia of the bolivian specimen are quite similar to those of the brazilian specimens, it is not certain if they are conspecific. The ecological distribution is quite different and its poor

state of preservation does not permit clear external comparison.

BIOLOGY. One of the specimens was collected in November.

DISTRIBUTION (Fig. 126). Bolivia, Brazil. Both brazilian localities are in the Tropical Moist Forest and the bolivian locality is in a transitional Zone between the Subtropical Moist Forest and the Tropical Premontane Dry Forest.

MATERIAL EXAMINED.

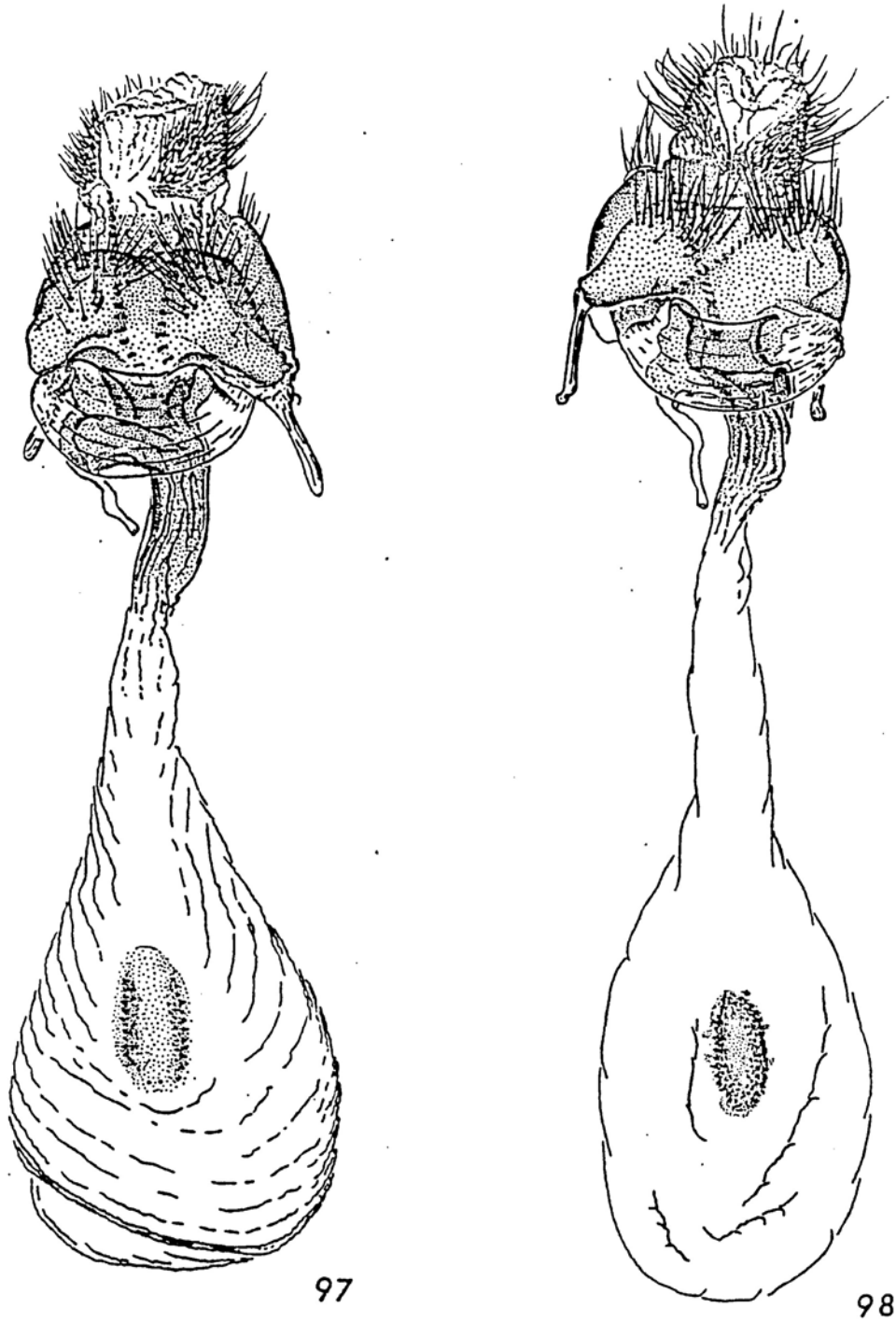
3 ♀ (2 genitalia preparations).

Bolivia: 1 ♀, Santa Cruz, Santa Cruz de la Sierra (Steinbach) (BMNH). Brazil: 1 ♀, Amazonas, Benjamin Constant, xi.1942 (Pohl) (NMNH, Washington); 1 ♀, Pará, Belém ('Pará') (Moss) (BMNH).

Timocratica species 7

(Figs 98, 126)

♀ 22mm. Frons white, edged with light fuscous. Second segment of labial palpi white, basal half ochreous below and dark fuscous externally above; third segment dark fuscous, few white scales basally. Antennae white, slightly fuscous towards apex. Fore coxae below, fore and middle femora above, basal half of fore tibiae above, middle and hind tarsi golden-yellow; distal half of fore tibiae above and fore tarsi dark fuscous. Fore wings



Vm
 91
 Figs 97-98 Genitalia of Timocratica ♀. 97, T. species 6, Brazil (slide, Becker; NMNH, Washington). 98, T. species 7, Colombia (slide no. 21006; BMNH).

with costa gently arched, apex angled, termen and tornus rounded; golden-ochreous below above cell, dark fuscous along apex and termen. Hind wings white above, golden-yellow below along costa. Abdomen white.

Genitalia ♀ (Fig. 98). Margin of ostium bursae slightly concave. Antrum long, posterior third nearly cylindrical, anterior two-thirds curved, strongly wrinkled longitudinally. Ductus bursae nearly cylindrical. Corpus bursae oblong, walls plain and smooth. Signum an elongate plate without spines along middle.

REMARKS. T. species 7 is very similar externally to species 6 and to argonais; however it can easily be distinguished from the former by the white upper surface of the hind wings and from the latter by the narrower antrum and undivided signum. It almost certainly represents a good species, but as no males are known it has not been named here.

BIOLOGY. Unknown.

DISTRIBUTION (Fig. 126). Colombia. The locality where the only specimen was collected is presumably in the Tropical Premonocane Wet Forest.

MATERIAL EXAMINED.

Colombia: 1 ♀, Cundinamarca, Medina (Fassl) (BMNH).

Timocratica megaleuca (Meyrick)

(Figs 99, 101)

Stenoma megaleuca Meyrick, 1912, Trans. ent. Soc. Lond.

1911:711. Holotype ♂, COLOMBIA: Cauca, Popayán, 1906

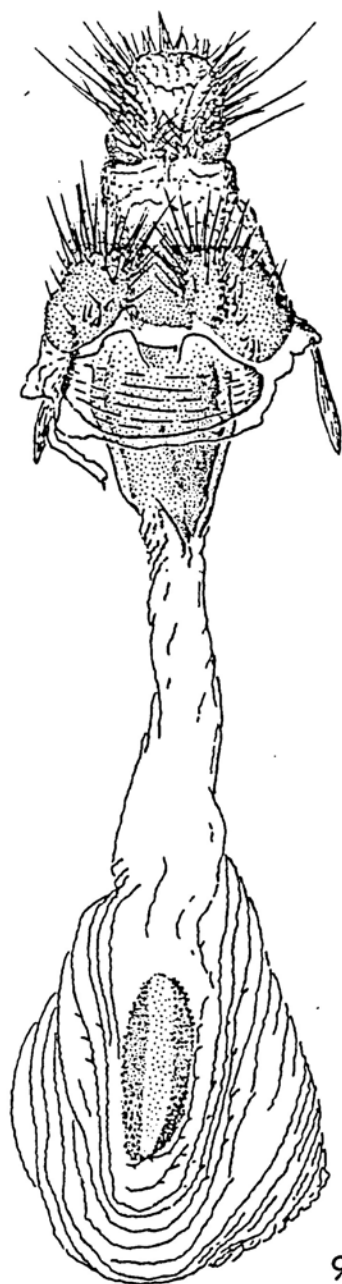
(L.) (genitalia slide 5496, Clarke; BMNH) [examined].Stenoma megaleuca Meyrick; Meyrick, 1925:224 [remarks].Timocratica megaleuca (Meyrick); Busck, 1935:17 [catalogue];

Clarke, 1955:391; pl. 195, figs 2-2b, 4a [adult,

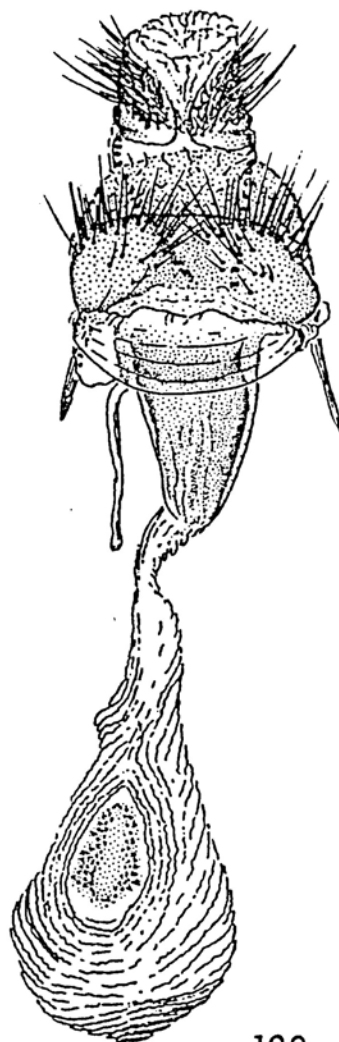
genitalia].

♂ 25mm. Frons white, edged with fuscous. Second segment of labial palpi ochreous externally, basal half above dark grey, white internally; third segment white, distal half black. Thorax above light fuscous, except tegulae. Fore coxae above, distal half of tibiae and fore tarsi dark fuscous; middle and hind tarsi ochreous. Fore wings with costa gently arched, apex angled, termen and tornus oblique-rounded; veins free; ochreous below, except along apex, termen and below cell. Hind wings white.

Genitalia ♀ (Fig. 99). Margin of ostium bursae slightly expanded posteriorly as two small lobes. Antrum bent dorsally, posterior third cylindrical, anterior two-thirds narrowing progressively towards ductus bursae. Ductus bursae widening progressively towards corpus bursae. Corpus bursae pear-shaped, walls slightly wrinkled longitudinally as in ductus bursae. Signum an elliptical plate without spines along middle.



99



100

Figs 99-100 Genitalia of Timocratica ♀. 99, T. megaleuca (Meyrick), holotype, Colombia (slide no. 5496, Clarke; BMNH). 100, T. palpalis (Zeller), Brazil (slide no. 533; colln V. Becker, Brazil).

REMARKS. T. megaleuca is extremely similar to palpalis and possibly a synonym of it, as is suggested by the ecological distribution of both. The genitalia of the only known specimen, the female holotype, differ very slightly from those of palpalis. However, as no males are available and, as the geographic distribution does not agree with that of palpalis, it seems preferable to retain it as a distinct species.

Meyrick (1925:224), commenting upon his original description stated, "Thorax and abdomen of the type (still unique) described as white (I suppose them to be discoloured); actually the thorax is tinged greyish-ochreous except patagia, abdomen suffused pale greyish-ochreous becoming greyer posteriorly; I now think this colouring may be natural, but am not certain; there is nothing of the sort in any of the allied species. Otherwise the species is nearest auxoleuca [palpalis]."

BIOLOGY. Unknown.

DISTRIBUTION (Fig. 101). Colombia (known only from the type-locality), in the Tropical Lower Montane Moist Forest.

MATERIAL EXAMINED.

Only the holotype.

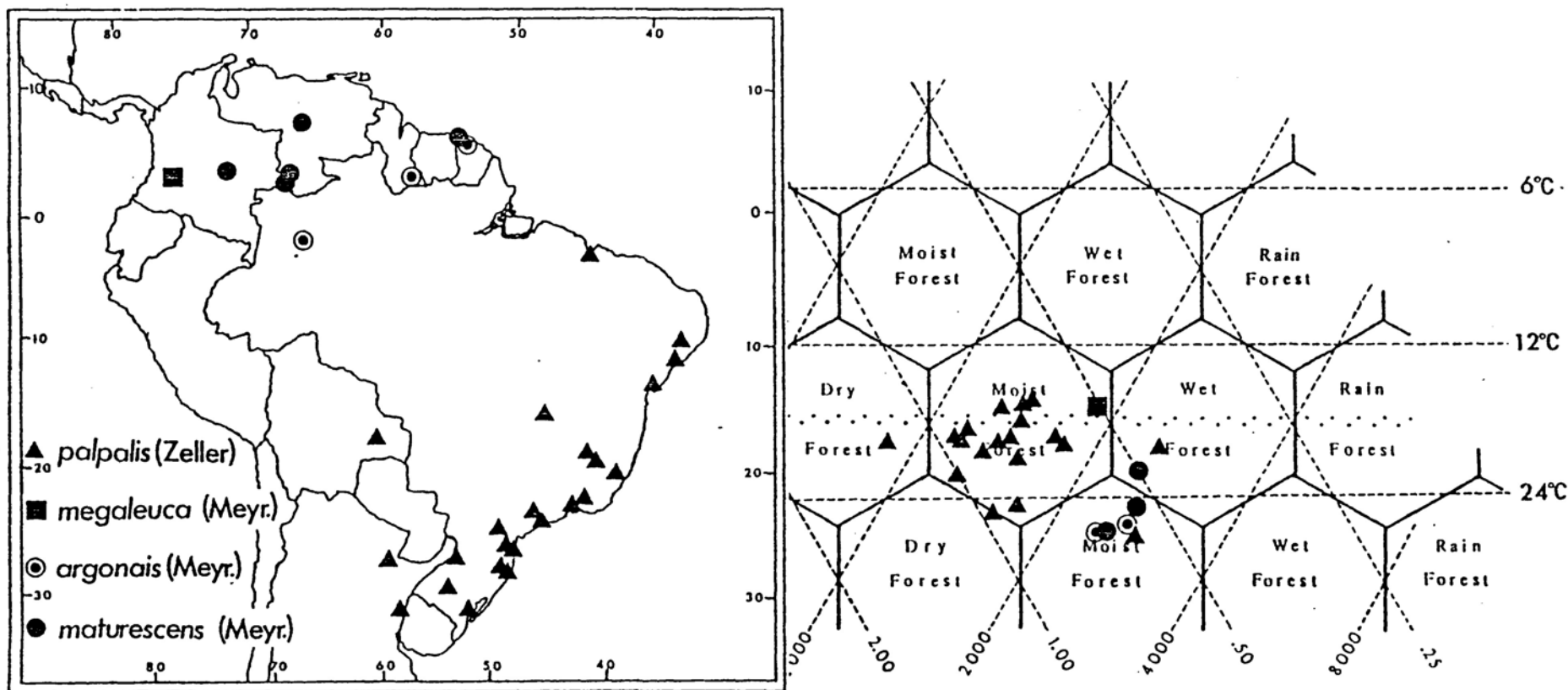


Fig. 101 Geographical and ecological distribution of the albella-complex of Timocratica.

Timocratica palpalis (Zeller)

(Figs 4, 7, 53, 100-111)

- Cryptolechia (Cryptolechia) palpalis Zeller, 1877, Horae Soc. ent. ross. 13:275. Holotype ♂, BRAZIL ('Bengal') (genitalia slide 3580, Duckworth; MNHU, Berlin) [examined].
- Stenoma auxoleuca Meyrick, 1925, Exot. Microlepidopt. 3:223. Lectotype ♂, BRAZIL: Espirito Santo, Leopoldina, 1924 (genitalia slide 5493, Clarke; BMNH), designated by Clarke, 1955:387. [Synonymized by Meyrick, 1926:239] [examined].
- Timocratica haywardi Busck, 1938, An. Soc. cient. argent. 126:280, figs 1-2. Holotype ♂, ARGENTINA: Entre Rios, Concordia (Hayward) (NMNH, Washington; no. 52792). [not examined]. Syn. n.
- Stenoma palpalis (Zeller); Meyrick, 1926:239 [syn. distr.].
- [Timocratica palpalis (Zeller)]; Hempel, 1909:68 [host, damage]; Ihering, 1909a:228 [host, damage]; Ihering, 1909b: 525 [host, damage].
- [Stenoma albella (Zeller); Bondar, 1912:15, figs 1-6; pl. 1 [host, damage, description]; Bondar, 1913:24, figs 17-20 [host, damage, description]; Lima, 1928:161 [host]; Andrade, 1928 [host, damage]; Lima, 1930 [cat.]; Santos, 1934:36 [host, damage]; Barbosa, 1933:288, fig. 113 [host, damage]; Ronna, 1933:332 [host, damage]; Fonseca, 1934:228 [host]; Monte, 1934:176, figs 161-162 [host, damage]; Ronna, 1934a [host, damage]; Ronna, 1934b [host, damage]; Pyenson, 1938 [host, damage]; Carvalho & Carvalho, 1939:47 [hosts]; Lima, 1950:1 [damage, control]; Silva & Heinrich, 1950:9 [hosts]; Bertels, 1954:61 [hosts]. Misidentifications.]

- [Timocratica albella (Zeller); Lima, 1936:277 [hosts]; Araujo, 1937:310 [host, control]; Caldeira & Vieira, 1938 [host]; Biezanko & Freitas, 1938:27 [cat. hosts]; Biezanko & Seta, 1939 [hosts]; Costa, 1942:248 [host, damage]; Lima, 1945:269 [hosts, damage, descrip., genit.]; Lepage & Figueiredo, 1946 [hosts]; Duarte, 1947:192 [host, damage, control]; Biezanko, Bertoldi & Baucke, 1949:[hosts]; Lofti, 1949:20 [host, damage, control]; Robbs, 1953:80 [host]; Costa, 1958:139 [host, damage]; Robbs, 1960:91 [host, damage]; Biezanko, 1961a:12 [hosts]; Biezanko, 1961b:6 [host]; Mariconi & Soubihe, 1961:35 [host, damage]; Maranhão, 1962:9 [host]; Pinheiro, 1962:248 [host]; Mariconi, 1963:389, figs 178C-D [hosts, damage, descript., control]; Sefer, 1963:42 [host]; Silva et alii, 1968 [hosts]; Gallo et alii, 1970:570 [hosts, damage]. Misidentifications]
- Timocratica palpalis (Zeller); Busck, 1935:17 [cat.].
- Timocratica auxoleuca (Meyrick); Clarke, 1955:387; pl. 193, figs 2-2b; [adult, genitalia]; Hayward, 1969:72 [hosts].

♂ 14-24mm, ♀ 19-25mm. Frons white, edged with fuscous. Second segment of labial palpi ochreous below except near distal articulation, basal half above dark grey, white internally and near distal articulation; third segment white, distal half progressively dark grey towards apex. Fore coxae, femora and basal half of tibiae ochreous above, femora tinged with dark grey above, distal half of tibiae, and tarsi dark greyish-fuscous; middle and hind tarsi ochreous. Fore wings with costa gently arched, apex angled, termen and tornus oblique-rounded; veins free; underside above cell and veins golden-ochreous, except along apex and termen. Hind wings and abdomen white.

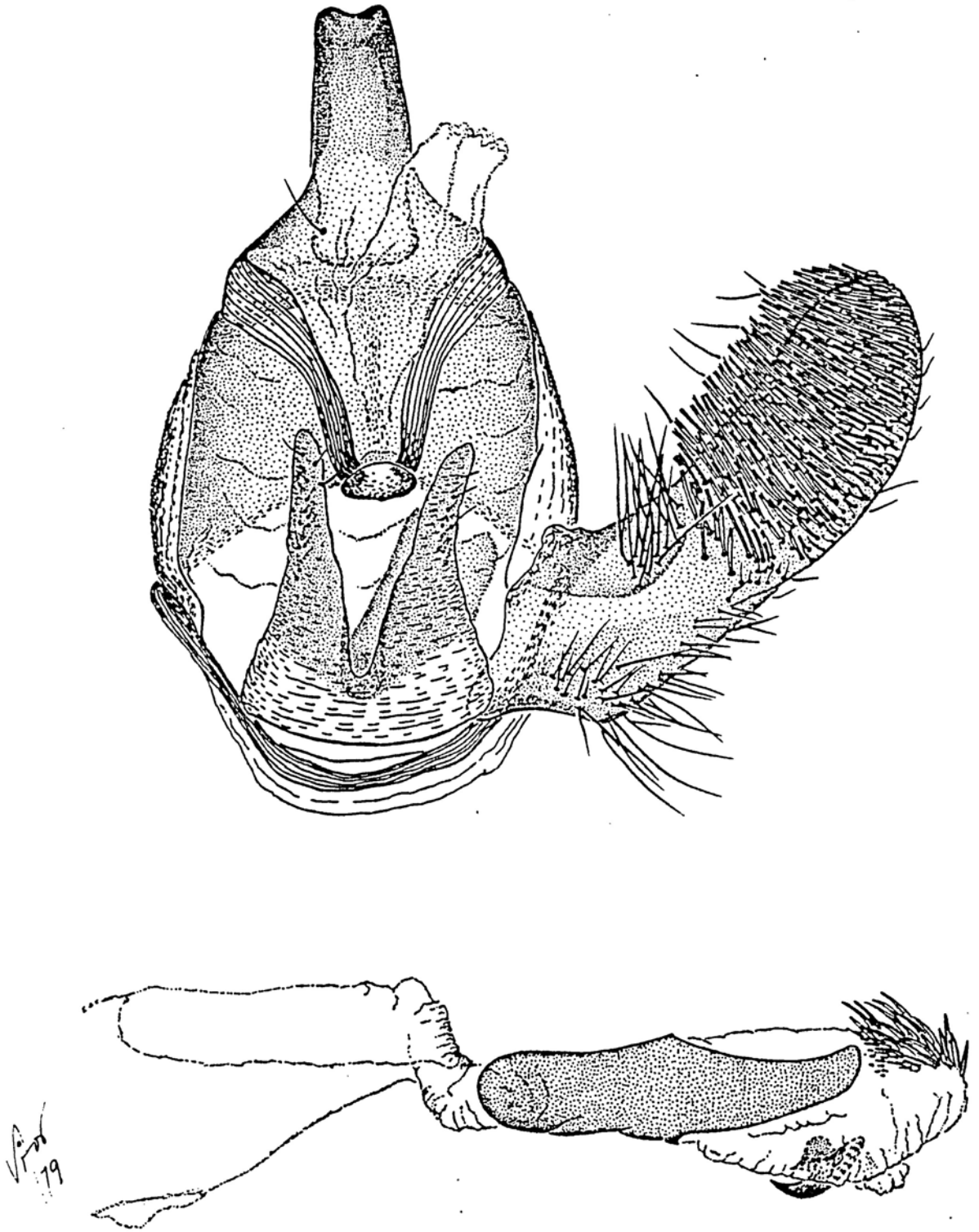


Fig. 102 Genitalia of *Timocratica palpalis* (Zeller), ♂, Brazil (slide no. 527; colln v. Becker, Brazil).

Genitalia ♂ (Fig. 102). Uncus with lateral margins parallel or narrowing slightly towards apex, apex concave. Apex of gnathos wide, rounded. Digitate processes of juxta wide basally, narrowing towards apex, distal two-thirds with long setae dorsally. Valvae with lateral margins nearly parallel or somewhat broadened at distal third, sacculus slightly pronounced. Aedeagus somewhat bent ventrad, vesica with strong bent cornutus and several smaller spines.

Genitalia ♀ (Fig. 100). Margin of ostium bursae slightly concave at middle. Antrum long, posterior third nearly cylindrical, anterior two-thirds narrowing progressively towards ductus bursae, with few longitudinal wrinkles. Ductus bursae widening progressively towards corpus bursae. Corpus bursae pear-shaped, walls strongly wrinkled as in ductus bursae. Signum a long elliptical plate, slightly constricted at middle, without spines in central area.

PUPA. ♂, ♀, length 15-19mm, maximum diameter 4.5-5.5mm.

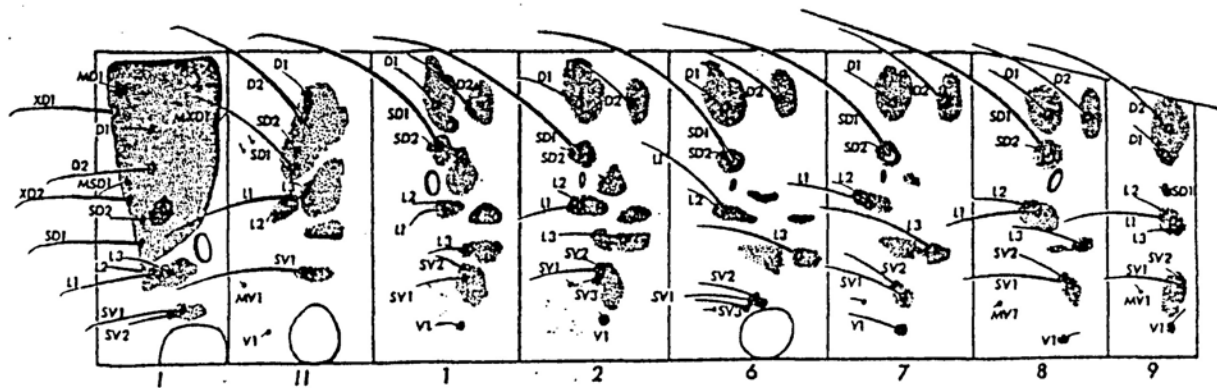
Indistinguishable from that of melanocosta.

LARVA (Figs 103-108). Length of largest larva 35mm; cylindrical, dark pinkish violet; pinnacula large, well defined, slightly prominent, dark brown. Anal comb absent. Meso and metathorax with extra sclerotized area, 'pinnacula without setae', between L's and SV1's; abdominal segments 1-2 with two extra sclerotized areas, 'pinnacula', on each segment, one behind spiracle, between SD's and L's, the other behind L1+L2, above L3; segments 3-7 with three extra sclerotized areas, two as in segments 1-2 and a third in front of L3, above SV's. Abdominal prolegs with 112-116

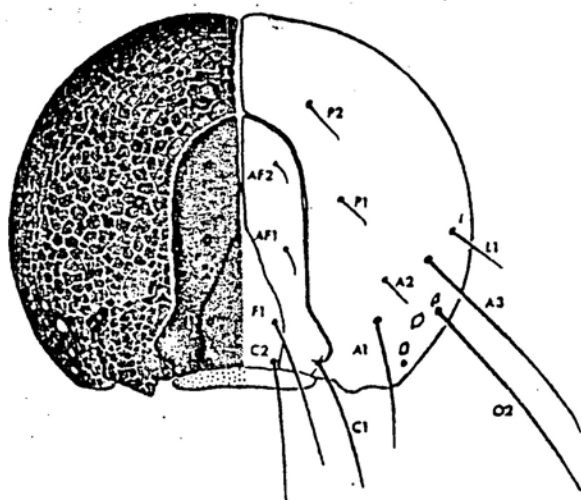


Fig. 103 Timocratica palpalis (Zeller), dorsal and lateral view of last instar larva.

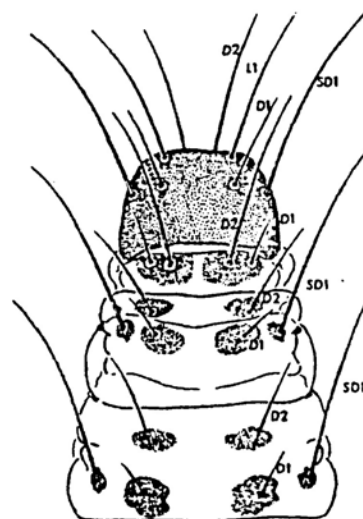
crochets in triordinal circle, anal prolegs with 58-62 crochets arranged triordinally in anal penelipse. Head hypognathous, nearly spherical, with irregular, hexagonally-sculptured surface, dark brown; adfrontal area not reaching to vertical angle; only primary setae present; mandible with two small blunt teeth; ocellus V below antenna; adfrontal area slightly prominent near clypeus; setae P2's closer to each other than P1's. Prothoracic plate prominent, strongly sclerotized, dark brown, with irregular-sculptured area behind SD2's; D1 equidistant to XD1 and D2, below level of former, posterior to second; SD2 between XD2 and SD1, slightly posterior to both; MXD1, MD1 and MSD1 present; L1, L2, L3 on same pinnaculum; SV1 and SV2 on same pinnaculum; spiracle vertically elongated. Meso and metathorax with D1, D2, SD1 and SD2 on same pinnaculum; D1 slightly posterior to D2; pinnaculum L1+L2 slightly connected with L3; SV1 below L3. Abdomen with spiracle on segment 1 twice the size of others; D1's on segment 1-2 slightly closer to each other than D2's, further apart on 3-7; SD2 on segments 1-8 present but greatly reduced; SV3 absent on segments 1 and 7-9.



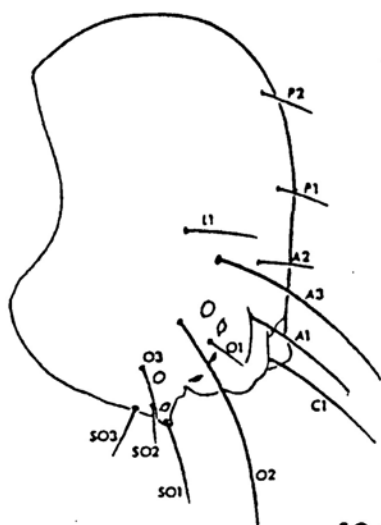
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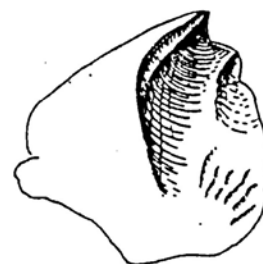
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107



106



108

Figs 104-108 *Timocratica palpalis* (Zeller), last instar larva. 104, setal map. 105, frontal view of head. 106, lateral view of head. 107, dorsal view of last three abdominal segments. 108, internal view of mandible.

REMARKS. T. palpalis is easily distinguished from any other species from southern South America, except isarga, by the dark fuscous fore tarsi and distal half of fore tibiae.

T. isarga has similarly coloured tarsi and tibiae but has the fore wings white below, CuA_1 and CuA_2 stalked, and hind tarsi white. T. megaleuca from Colombia is probably also a synonym of palpalis, as discussed under Remarks of that species.

As a large number of specimens were available for study, either collected at light or bred from different hosts and from different places, some variation in size and also in genitalia was found. Specimens from warmer areas such as the east, the Central Plateau and the coast of Brazil, south to the lowlands of Santa Catarina, are on average larger than those from the Parana Plateau, South Brazil and Argentina. Variation of the male genitalia occurs mainly in the shape of the valvae and digitate processes of the juxta. The valvae may be slightly narrowed with the margins nearly parallel, or have the distal half somewhat broadened and the sacculus slightly pronounced. In some specimens the digitate processes of the juxta are broad, nearly triangular, with the margins converging progressively towards the apex, whereas in others the distal half is very narrow.

This species, referred to as albella (Zeller), in the Brazilian economic literature, is the most common species in the south of South America, mainly in southern Brazil and northern Argentina, and is a pest of ornamental, fruit

and timber tress. As the adults are almost white, it was originally identified as stenoma albella (Zeller) (Bondar, 1912:15) and this name has been used by all subsequent authors. This is easy to explain, for at that time albella was the only available name for a large white stenomine, since grandis has golden-yellow hind wings, and palpalis was still considered an East Indian species.

Although the holotype bears the label 'Bengal', there is no doubt that it represents this South American species, as was pointed out by Meyrick (1926:239).

BIOLOGY. The larvae of T. palpalis are polyphagous bark-feeders and considered to be pests of ornamental, fruit and timber trees in Brazil and Argentina. They tunnel into the trunk and larger branches of the host-plant, feeding on the bark surrounding the holes (Fig.109). No branches of less than 2cm diameter were found infested. The tunnel is shallow, only 5-8cm long and about 5mm wide when the larva is ready to pupate. The tunnel begins more or less at right angles to the axis of the wood and then follows the pith (Fig.110). Larvae collected in Brusque, Santa Catarina, were tunneling the trunk upwards, whereas those collected in Sete Lagoas, Minas Gerais, were tunneling down towards the base of the tree. In the former locality it rains throughout the year, making it necessary to tunnel upwards to avoid flooding of the hole, whereas in Sete Lagoas, in the Central Plateau of Brazil, the larvae develop during a well defined dry season, when there is no such danger. The larvae cover the eaten areas of the bark with frass (Fig.109), and so remain hidden



Figs 109-110 Timocratica palpalis (Zeller). 109, branch of Pyrus comunis with eaten areas covered with frass (O. Mielke photo.). 110, split branch of Psidium guajava with larva inside gallery.

when feeding outside the tunnel. No larvae were found feeding during the day.

The larva pupates inside the tunnel. The pupa is attached by the cremaster to a few strings of silk on the tunnel wall.

From field observations and label data it seems that there is a cline of the flight period of adults. Specimens from warmer areas emerge earlier in the season than those from cooler places. Most specimens from Minas Gerais were collected from early October to late February, the ones from the lowlands of Santa Catarina, further South, emerged at the beginning of December, the specimens from Rio Grande do Sul were collected in January, while the specimens bred by Hayward in Argentina emerged in March. Possibly, the species has two generations in warmer localities, while being univoltine further south, where the average temperature is lower.

T. palpalis is usually a minor pest but when infestation is high, it may become a problem and seriously damage the trees (Fig. 111). When the trunk or branch is ring-barked, the tree dies beyond that point, as the sap flow is disrupted. In some Myrtaceae, such as guava (Psidium guajava L.), the bark never recovers and the trunk becomes deformed where it was damaged. In the Brazilian capital Brasilia, strong infestation was found in a number of Tibouchina candolleiana (Melastomataceae), an ornamental tree with attractive pink and violet flowers. Some of the plants contained more than a hundred larvae. Considering that one larva can seriously



Fig. 111 Timocratica palpalis (Zeller). Trunk of
Tibouchina candolleiana (Melastomataceae)
damaged by the larvae.

damage or even kill a whole branch, such an infestation is very serious.

It seems that the preferred host-plants are Myrtaceae, mainly species of the genus Psidium, and it is very easy to find the larvae feeding on guava, a common fruit tree in South America. Table 1 gives a list of the host plants of T. palpalis from my own observations and the literature.

Sometimes the larvae are heavily parasitized. About 80% of the larvae collected in Brasilia on Tibouchina candolleiana were parasitized by an apparently undescribed species of Eudeleboea (Ichneumonidae). They may also be preyed on by birds. A wild guava species (Psidium sp.), found near Planaltina, Distrito Federal, at the beginning of September, 1978, had branches attacked by three larvae. However, it was found that each larval gallery had a fresh hole near the middle, made by an unidentified species of woodpecker, through which the bird had removed the larva. It is interesting to note that Psidium species have a very hard wood and the bird had to make a two centimeter-deep hole to reach the larvae.

DISTRIBUTION (Fig. 101). Northern Argentina, Bolivia, Brazil. This species has not only a wide range of food-plant preference and geographical distribution, but also a wide range of ecological distribution. It has been collected from the Warm Temperate Dry Forest, in the North Argentina 'Chaco' area, and Warm Temperate Moist Forest of Southern Brazil and Argentina, crossing the Subtropical Moist Forest of South Brazil, up to the Tropical Moist Forest of the Northeast

Table 1 Fodd plants of T. palpalis

Scientific names	English vernacular names	Brazilian vernacular names
ACERACEAE		
<u>Acer saccharinum</u>	Silver maple	
<u>A. platanoides</u>	Norway maple	
CASUARINACEAE		
<u>Casuarina equisetifolia</u>	Casuarina, willow, whistling pine	Casuarina
CUNONIACEAE		
<u>Belangeria tomentosa</u>		Cangalheiro
EBENACEAE		
<u>Diospyros kaki</u>	Kaki	Caqui
FAGACEAE		
<u>Castanea sativa</u>	Sweet chestnut	Castanheira
<u>Quercus robur</u>	British Oak	Carvalho-inglês
LAURACEAE		
<u>Persea americana</u>	Avocado pear	Abacateiro
MELASTOMATACEAE		
<u>*Tibouchina candolleiana</u>		Quaresmeira
<u>*T. urvilleana</u>		Quaresmeira
MYRTACEAE		
<u>Calycorectes pohlianus</u>		Cambucazeiro
<u>Camponesia acida</u>		Araçá-do-Pará
<u>Eucalyptus alba</u>	Timor white gum	Eucalipto
<u>E. camaldulensis</u> (= <u>E. rostrata</u>)	Murray red gum	Eucalipto
<u>E. citriodora</u>	Lemon scented spotted gum	Eucalipto
<u>E. propinqua</u>		Eucalipto
<u>*E. saligna</u>	Sydney blue gum, saligna gum	Eucalipto
<u>E. tereticornis</u>	Forest red gum	Eucalipto

Table 1 (cont.)

Scientific name	English vernacular names	Brazilian vernacular name
MYRTACEAE (cont.)		
<u>Eugenia brasiliensis</u>		Grumixameira
<u>E. uniflora</u>	Suriname cherry	Pitangueira
* <u>E. involucrata</u>		Cerejeira-de-folha-miúda
<u>Hexachlamys edulis</u>		Cereja-do-Rio Grande
<u>Marlierea tomentosa</u>		Garapuruna
<u>Myrcia fenzliana</u>		Guamirim-araçá
<u>Myrciaria trunciflora</u>		Jaboticabeira
* <u>Psidium guajava</u>	Guava	Goiabeira
<u>P. guineense</u>	Guaiana guava	Araçá-azedo
<u>P. humile</u>		Araçá-vermelho
<u>Syzygium jambos</u>	Rose apple	Jambeiro
<u>S. malaccense</u>	Otaheite apple	Jambeiro-vermelho
PLATANACEAE		
<u>Platanus orientalis</u>	Oriental plane	Plátano-oriental
PROTEACEAE		
<u>Macadamia ternifolia</u>	Queensland nut	Macadamia
PUNICACEAE		
<u>Punica granatum</u>	Pomegranate	Romanzeira
ROSACEAE		
<u>Cydonia vulgaris</u>	Quince	Marmeleiro
<u>Eriobotrya japonica</u>	Loquat	Ameixeira-do-Japão
* <u>Malus domestica</u>	Apple	Macieira
<u>M. sylvestris</u>	Crab apple	Macieira-silvestre

Table 1 (cont.)

Scientific name	English vernacular name	Brazilian vernacular name
ROSACEAE (Cont.)		
<u>Prunus amygdalus</u>	Almond	Amendoeira
<u>P. armeniaca</u>	Common apricot	Abricó
<u>P. domestica</u>	Common garden plum	Ameixeira
<u>P. persica</u>	Peach	Pêssego
* <u>Pyrus communis</u>	Common pear	Pereira
* <u>P. sinensis</u>	Sand pear, japanese pear, Chinese pear	Pereira-do-Japão
RUBIACEAE		
<u>Coffea arabica</u>	Arabian coffee	Cafeeiro
SALICACEAE		
<u>Salix viminalis</u>	Osier willow	Vimeiro
TILIACEAE		
<u>Luehea divaricata</u>		Açoita-cavalo
ULMACEAE		
<u>Ulmus americana</u>	White elm	

*Author's observations; others were quoted from Araujo et al. (1968), and Hayward (1969), and from label data.

English vernacular names were quoted from Adams (1972) and Bailey (1900-1902), and the Brazilian vernacular names for the Myrtaceae from Legrand & Klein (1967-1978).

Brazilian coast. The high concentration of localities in the Warm Temperate and Subtropical moist Forest Life Zones does not indicate that this species is chiefly associated with these Life Zones, but probably means that the species has been more intensely collected there.

MATERIAL EXAMINED.

112 ex. (69 ♂, 31 ♀, 8 larvae, 4 pupae; 7 ♂, 5 ♀ genitalia preparations).

Argentina: 5 ♂, Entre rios, Concordia, ex guava [Psidium guajava L.], iii.1937 (Hayward, no. 3258) (BMNH; NMNH, Washington) (paratypes of T. haywardi Busck); 1 ♂, Entre Rios, Concordia, ex pomegranate [Punica granatum L.], iii.1938 (Hayward, no 3258) (NMNH, Washington) (paratype of T. haywardi Busck); 1 ♂, Santa Fé, Villa Ana, iii.1924 (Hayward) (BMNH). Bolivia: 1 ♂, Nuflo de Chaves, Esperanza (BMNH). Brazil: 1 ♂, no further data (BMNH); 1 ♂, 2 ♀, Alagoas, Maceió ['Maceo'] (BMNH); 1 ♂, 2 ♀, Bahia, Salvador ('Bahia') (Fruhstorfer) (BMNH); 3 ♂, Distrito Federal, Brasilia, 10.x.1979 (Gomes) (colln V. Becker, Brazil, no. 39469); 10 ♂, 2 ♀, Distrito Federal, Planaltina, 5-25.xi.1975, 12.ii.1976, 6-15.xi.1977, 20.ii.1978, 21.xi.1978 (Becker, nos 19395, 19426, 19447, 22087, 22088, 22210, 22300, 22310) (colln V. Becker, Brazil; BMNH; MNHU, Berlin; NM, Vienna; NMNH, Washington); 3 ♂, 8 larvae, 4 pupae, Distrito Federal, Planaltina, 1000m, ex Tibouchina candolleiana, 9-16.xi.1978 (Becker, no. 35007) (colln V. Becker, Brazil; BMNH; NMNH, Washington); 1 ♀, Espírito Santo, 1910 (Fruhstorfer) ['F.'] (BMNH); 1 ♂, Minas Gerais,

Leopoldina (Staudinger) (MNHU, Berlin); 1 ♀, Maranhão (BMNH); 1 ♂, Agua Suja, x.1906 (Baer) (BMNH); 2 ♂, Minas Gerais, Cordisburgo, ex Psidium guajava, 5, 16.xi.1974 (Becker, no. 16033) (colln V. Becker, Brazil); 3 ♂, 2 ♀, Minas Gerais, Cordisburgo, ex Eugenia involucrata, 3.x-23.xi.1974 (Becker, no. 16034) (colln V. Becker, Brazil; BMNH); 3 ♂, Minas Gerais, Sete Lagoas, 720m, 20.i; 10; 18.ii.1969 (Becker, nos 63, 64; 30194; Biezanko) (colln V. Becker, Brazil; LN, Karlsruhe); 4 ♂, 2 ♀, Minas Gerais, Sete Lagoas, 720m, ex Psidium guajava, 2.x.-14.xii.1974, 8.ii.1975 (Becker, nos 16030, 16032) (colln V. Becker, Brazil; BMNH; NMNH, Washington); 7 ♂, Paraná, Castro, 1896-1898 (Jones) (BMNH); 1 ♂, 1 ♀, Paraná, Curitiba, 920m, 11.xii.1971, 2.ii.1974 (Becker, nos 16074, 16089) (colln V. Becker, Brazil); 2 ♂, Paraná, Mandirituba, 13.xii.1969 (Becker, no. 16026) (colln V. Becker, Brazil); 1 ♀, Pernambuco, Serra do Comunati (Gounelle) (BMNH); 1 ♂, 1 ♀, Rio de Janeiro (BMNH); 1 ♂, Rio Grande do Sul, Guarani, 7.i.1954 (Biezanko) (BMNH); 1 ♂, Rio Grande do Sul, Pelotas, 29.i.1960 (Biezanko) (BMNH); 1 ♂, Rio Grande do Sul, Pelotas, 22.i.1965 (Guerra) (colln V. Becker, Brazil, no 16024); 2 ♀, Rio Grande do Sul, Santa Maria, ex Malus domestica, 16.ii.1979 (Link) (colln V. Becker, Brazil, no. 35031); 1 ♂, 2 ♀, Rio Grande do Sul, Santa Maria, ex Pyrus comunis, 16.ii.1979 (Link) (colln V. Becker, Brazil, no. 35032); 1 ♂, 3 ♀, Rio Grande do Sul, Santa Maria, ex Psidium guajava, 17.ii.1979 (Link) (colln V. Becker, Brazil, no. 35033); 1 ♂, 1 ♀, Rio Grande do Sul, Santa Maria, ex Luehea divaricata, 28.ii.1979 (Link)

(colln V. Becker, Brazil, no. 35034); 1 ♂, 4 ♀, Santa Catarina, Brusque, ex Psidium guajava, 6-29.xii.1970 (Becker, no. 15882) (colln V. Becker, Brazil; BMNH; NMNH, Washington); 1 ♀, Santa Catarina, Corupá, xii.1955 (Maller) (NMNH, Washington); 1 ♂, Santa Catarina, Rio Vermelho, vii.1954 (Maller) (NMNH, Washington); 2 ♂, São Paulo, São Paulo, 1889 (Jones) (BMNH); 1 ♂, 1 ♀, São Paulo, 1910 (Ihering) (BMNH); 4 ♂, São Paulo, Piracicaba, 540m, xii.1965-i.1966 (ESALQ, Piracicaba).

Timocratica melanocosta sp. n.

(Figs 112-117, 119, 126)

♂ 14-18mm, ♀ 16-19mm. Frons white. Second segment of labial palpi golden-ochreous, white internally and around distal articulations; third segment black with white scales towards base. Fore coxae below, femora and basal two-thirds of tibiae golden-ochreous above; distal third of tibiae, and tarsi dark fuscous below, mixed with white scales above; distal joint of middle femora, and tibiae golden-ochreous externally, middle tarsi dark fuscous below, or white, proximal articulations of hind tibiae slightly tinged with golden ochreous. Fore wings with costa strongly arched at base, then gently arched, apex angled, termen slightly oblique-rounded, tornus rounded; veins free; basal third of costa tinged with dark grey; white below. Hind wings and abdomen white.

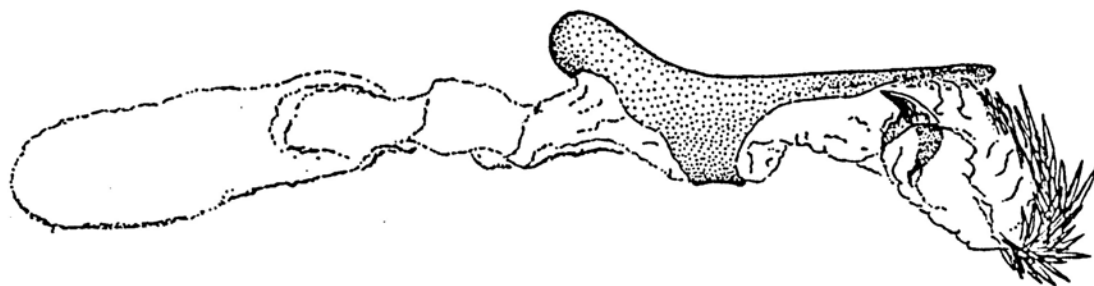
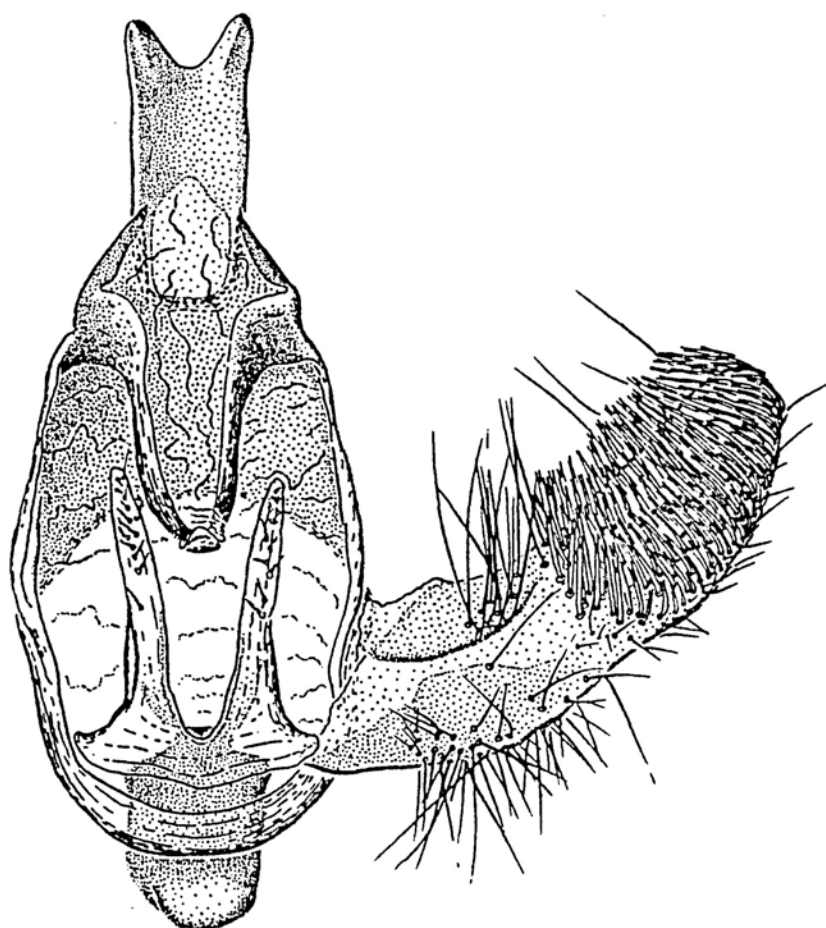


Fig. 112 Genitalia of *Timocratica melanocosta* sp. n.,
 ♂, paratype, Brazil (slide no. 539; colln
v. Becker, Brazil).

Genitalia ♂ (Fig. 112). Lateral margins of uncus nearly parallel, apex strongly concave, nearly bifurcate. Apex of gnathos nearly triangular. Digitate processes of juxta broadened basally, narrowing progressively to basal third, then straight; distal half with sparse setae dorsally. Valvae with lateral margins nearly parallel, sacculus slightly pronounced. Aedeagus nearly straight, vesica with strong cornutus and many acute-pointed spines opposite.

Genitalia ♀ (Fig. 119). Margin of ostium bursae rounded. Antrum funnel-shaped, bent, with strong longitudinal wrinkles. Ductus bursae broadening progressively towards corpus bursae. Corpus bursae pear-shaped, walls slightly wrinkled as in ductus bursae. Signum a round or elliptical plate without spines at middle.

PUPA (Figs 113). ♂, length 16-17mm, maximum diameter 4.5-5mm. Brown, darker towards head. Setae minute. Pronotum strongly expanded forwards, displacing pronotum-head suture to a ventral position, longitudinally wrinkled. Meso and metanotum irregularly wrinkled. Cremaster with pair of long processes, directed cephalad, reaching sixth segment, apices with many small, hook-like setae.

LARVA. Length of largest larva 30mm. Very similar to that of palpalis and almost indistinguishable from it, except for the following characters: extra sclerotized area, 'pinnaculum without setae', behind spiracle greatly reduced on abdominal segments 3-4, absent on segments 5-7.

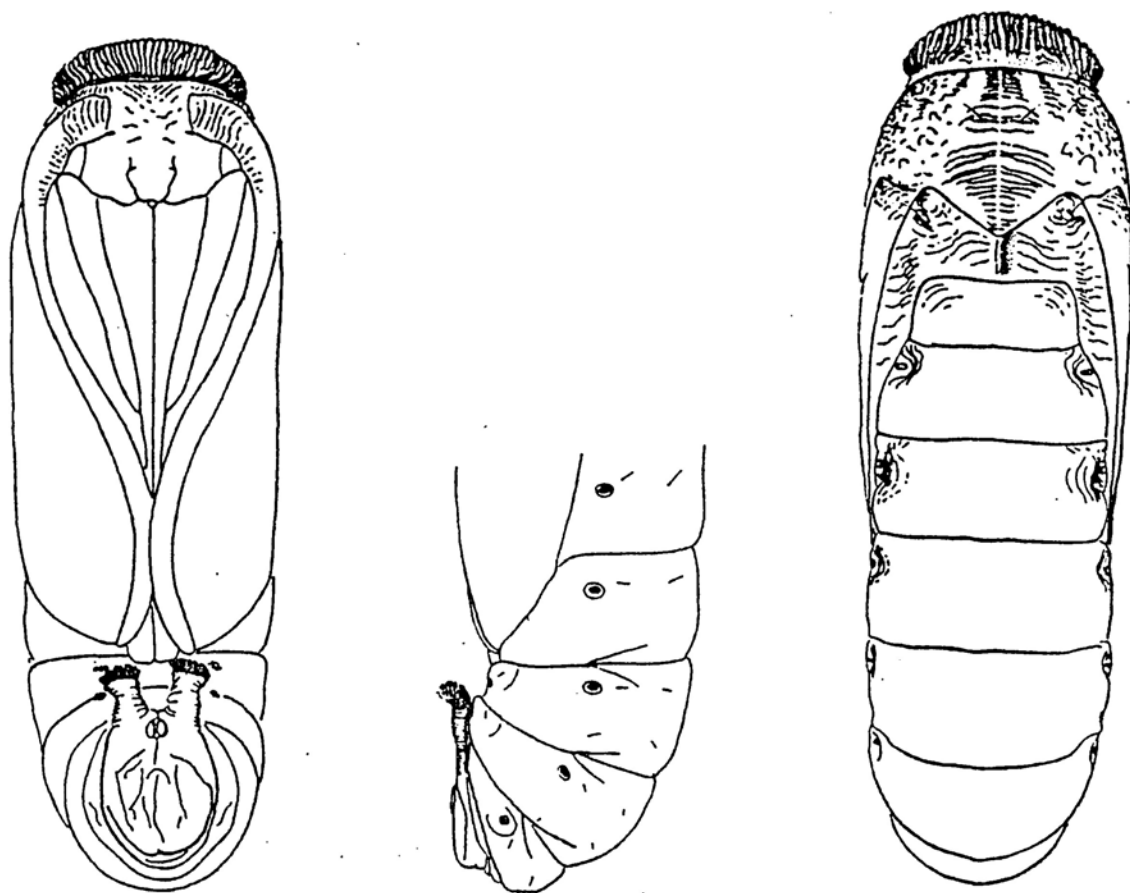


Fig. 113 Timocratica melanocosta sp. n., ventral,
lateral and dorsal view of pupa.

REMARKS. T. melanocosta is the closest species to palpalis but easily distinguishable from it, and others in the group, by the grey tinge along the basal third of the fore wing costa.

Specimens from Bananal island, bred from Byrsonima sp. have the middle tarsi almost white whereas most specimens, such as those from Minas Gerais and Distrito Federal, have tarsi which are dark fuscous below. However, in all other respects, including genitalia, the specimens agree very well.

BIOLOGY. The behavior and feeding habits of the larvae of this species are almost the same as in palpalis (Figs 114-116). Most of the specimens studied were obtained from larvae feeding on Erythroxylum suberosum (Erythroxylaceae) and on Byrsonima sp. (Malpighiaceae). The adults emerged from October to December.

DISTRIBUTION (Fig. 126). Brazil (Central plateau and dry areas of the Southern border of the Amazon Basin). Specimens of this species were collected in the Tropical Premontane Moist Forest and Tropical Moist Forest. However, it is important to point out that its host plants are not part of a climatic association, but are one of the components of the atmospheric monsoon-type of association called 'cerrado' in Brazil (Fig. 117), (see discussion of this association under major).



Figs 114-116 Timocratica melanocosta sp. n., branches of the food-plant, Erythroxylum suberosum (Erythroxylaceae). 114, eaten areas of bark covered with frass. 115, eaten areas with frass removed to show entry of gallery at centre. 116, branch split with gallery and pupa.

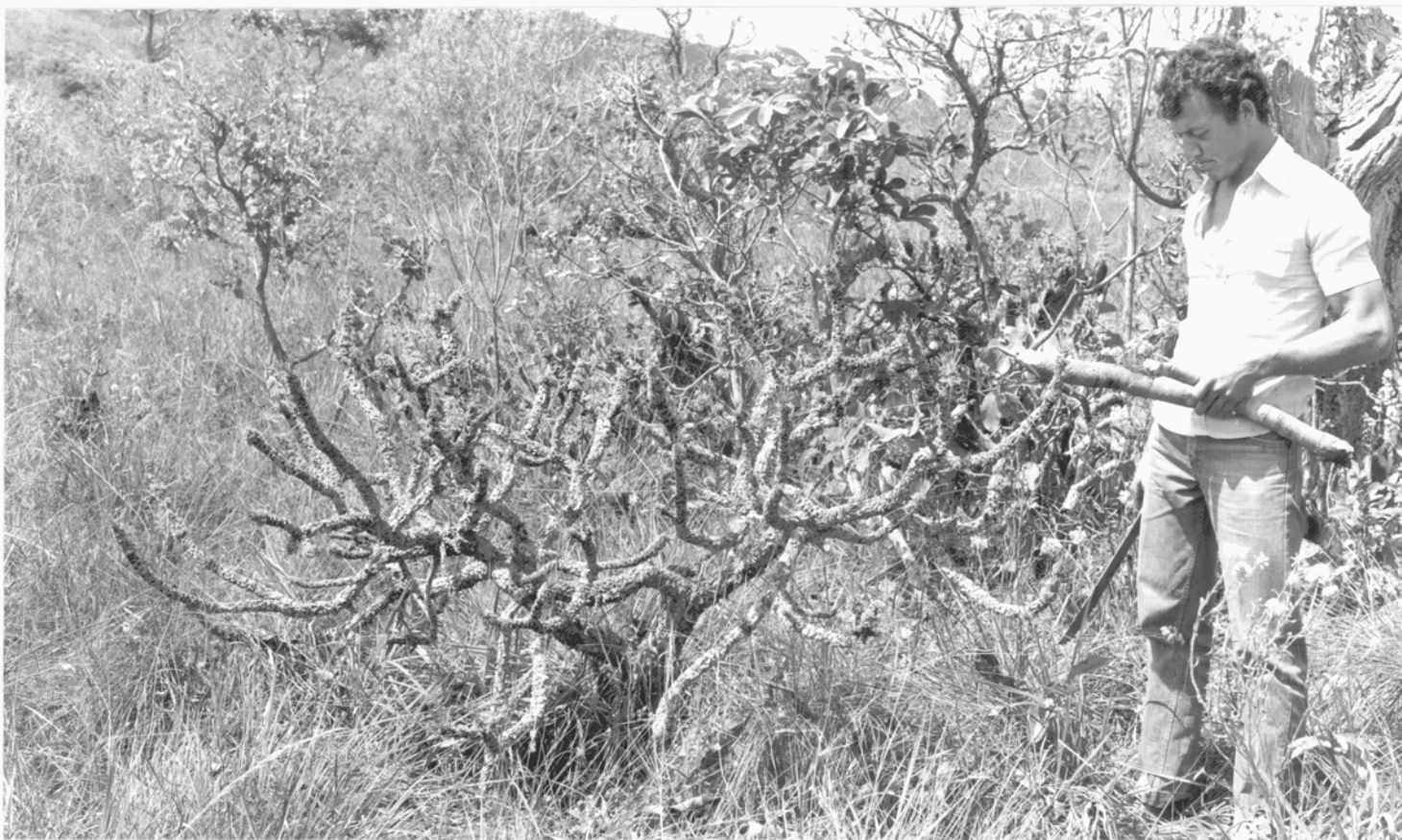


Fig. 117 Timocratica melanocosta sp. n., habitat and food-plant,
Erythroxylum suberosum (Erythroxylaceae).

MATERIAL EXAMINED.

73 ex. (34 ♂, 27 ♀, 8 larvae, 4 pupae; 6 ♂, 5 ♀ genitalia preparations).

Holotype ♂, Brazil: Distrito federal, Planaltina, 1000m, 9.xi.1977 (Becker, no. 22209) (MN, Rio de Janeiro).

Paratypes. Brazil: 4 ♂, 3 ♀, Minas Gerais, Sete Lagoas, 720m, ex Erythroxylum suberosum, 13.x-18.xi.1974, 26.x. 1978 (Becker, nos 16031, 35005) (colln V. Becker, Brazil; BMNH); 2 ♂, 1 ♀, Distrito federal, Brasilia, 1000m, 10.x. 1979 (Gomes) (colln V. Becker, no. 39470); 8 ♂, 2 ♀, Distrito Federal, Planaltina, 1000m, 5.xi, 23.xi, 16.xii. 1975; 11.xi.1977; 26.x-10.xi.1978 (Becker, nos. 19426, 19438, 22301, 35006, 35008, 35026) (colln V. Becker, Brazil; BMNH; MNHU, Berlin; NMNH, Washington); 19 ♂, 21 ♀, 8 larvae, 4 pupae, Goiás, Bananal Island, ex Byrsonima sp., 24.x-15.xi.1977 (Becker, no 21725) (colln V. Becker, Brazil; BMNH; LN, Karlsruhe; MNHU, Berlin; NM, Vienna; NMNH, Washington; ZSBS, Munich).

Timocratica nivea sp. n.

(Figs 54-56, 118, 120, 138)

♂ 15-17mm, ♀ 19-20mm. Frons white. Second segment of labial palpi white with black scales basally above; third segment white below, black above. Legs white; fore coxae tinged with golden-yellow, fore femora above, tibiae and tarsi dark grey below. Fore wings with basal third of costa arched, distal two-thirds nearly straight; apex angled, termen and tornus oblique-rounded; veins free or CuA_1 and CuA_2 connate or stalked; white below. Hind wings and abdomen white.

Genitalia ♂ (Fig. 118). Lateral margins of uncus nearly parallel; apex strongly concave, nearly bifurcate. Apex of gnathos pointed. Digitate processes of juxta with lateral margins parallel, narrowing progressively near apex, with sparse setae on distal half dorsally. Valvae with lateral margins nearly parallel or somewhat broadened at middle, bent dorsally. Aedeagus bent ventrad at basal third, vesica with strong bent cornutus and many smaller spines of different sizes opposite.

Genitalia ♀ (Fig. 120). Margin of ostium bursae rounded. Antrum wide, somewhat narrowed towards anterior end, with a few strong longitudinal wrinkles. Ductus bursae broadening progressively towards corpus bursae, scobinated. Corpus bursae pear-shaped, finely scobinated. Signum a round plate without spines at middle.

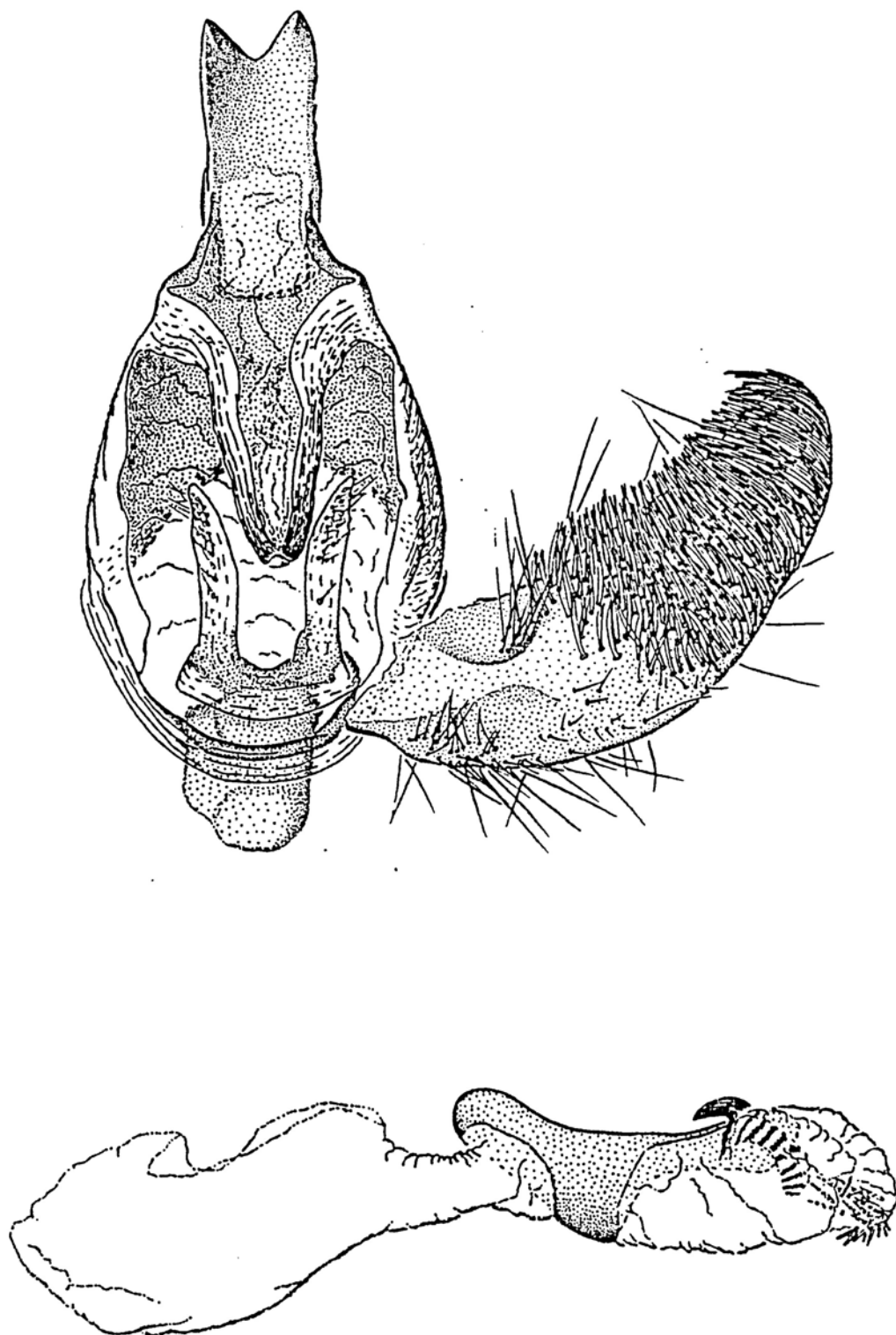


Fig. 118 Genitalia of Timocratica nivea sp. n., ♂, paratype, Brazil (slide no. 549; colln V. Becker, Brazil).

REMARKS. T. nivea is similar to melanocosta, albella and isarga but easily distinguished by the absence of ochreous coloration on its labial palpi. The male and female genitalia are very close to those of melanocosta, except for the narrow base of the digitate processes of the juxta in the male. The arrangement of the CuA veins is very variable. Of eleven specimens examined, two females and four males have these veins free, two have them connate, two shortly stalked, and in one specimen they are connate on the left wing and shortly stalked on the right one (Figs 54-56).

BIOLOGY. Moths have been collected in October and November.

DISTRIBUTION (Fig. 138). Brazil (Central Plateau). This species is sympatric with melanocosta (see discussion on ecology under that species).

MATERIAL EXAMINED.

13 ex. (10 ♂, 3 ♀; 3 ♂, 2 ♀ genitalia preparations).

Holotype ♂, Brazil: Distrito Federal, Planaltina, 1000m, 15.xi.1975 (Becker, no. 19418) (MN, Rio de Janeiro).

Paratypes. Brazil: 1 ♂, Minas Gerais, Sete Lagoas, 720m, 18.x.1969 (Becker) (colln V. Becker, Brazil, no. 65); 8 ♂, 3 ♀, Distrito Federal, Planaltina, 1000m, 5-15.xi.1975, 11.xi.1976, 10.xi.1978, 10.x.1979 (Becker, Gomes; nos 19395, 19418, 19502, 35009, 39471) (colln V. Becker, Brazil; BMNH; NMNH, Washington; MNHU; Berlin).



119



120


 Figs 119-120 Genitalia of Timocratica ♀. 119, T. melanocosta sp. n., paratype, Brazil (slide no. ; colln V. Becker, Brazil). 120, T. nivea sp. n., paratype, Brazil (slide no. 551; colln V. Becker, Brazil).

Timocratica albitogata sp. n.

(Figs 121, 123, 126)

♂ 19-25mm, ♀ 25-28mm. Frons white. Second segment of labial palpi dark grey above on basal half, tinged with ochreous basally below, white internally; third segment white, progressively black from basal third to apex. Fore coxae and femora golden-ochreous below, fore tibiae and tarsi dark greyish-fuscous below; distal half of tibiae, and tarsi white above; middle and hind tarsi golden-ochreous. Fore wings with costa gently, evenly rounded; apex nearly rounded, somewhat angled; termen and tornus oblique-rounded; veins free; white below. Hind wings and abdomen white.

Genitalia ♂ (Fig. 121). Uncus with lateral margins nearly parallel, apex strongly concave. Apex of gnathos narrow. Digitate processes of juxta very long, lateral margins nearly parallel, distal half above with long setae. Valvae long, lateral margins evenly rounded, nearly parallel, narrowing progressively from apical third to apex. Aedeagus nearly straight, vesica with strong bent cornutus and several smaller spines.

Genitalia ♀ (Fig. 123). Margin of ostium bursae nearly straight. Antrum very wide posteriorly, narrowing progressively towards ductus bursae, with few longitudinal wrinkles. Ductus bursae somewhat constricted near antrum, widening progressively towards corpus bursae. Corpus bursae pear-shaped, walls wrinkled longitudinally as in ductus bursae. Signum an elongate elliptical plate without spines at centre.

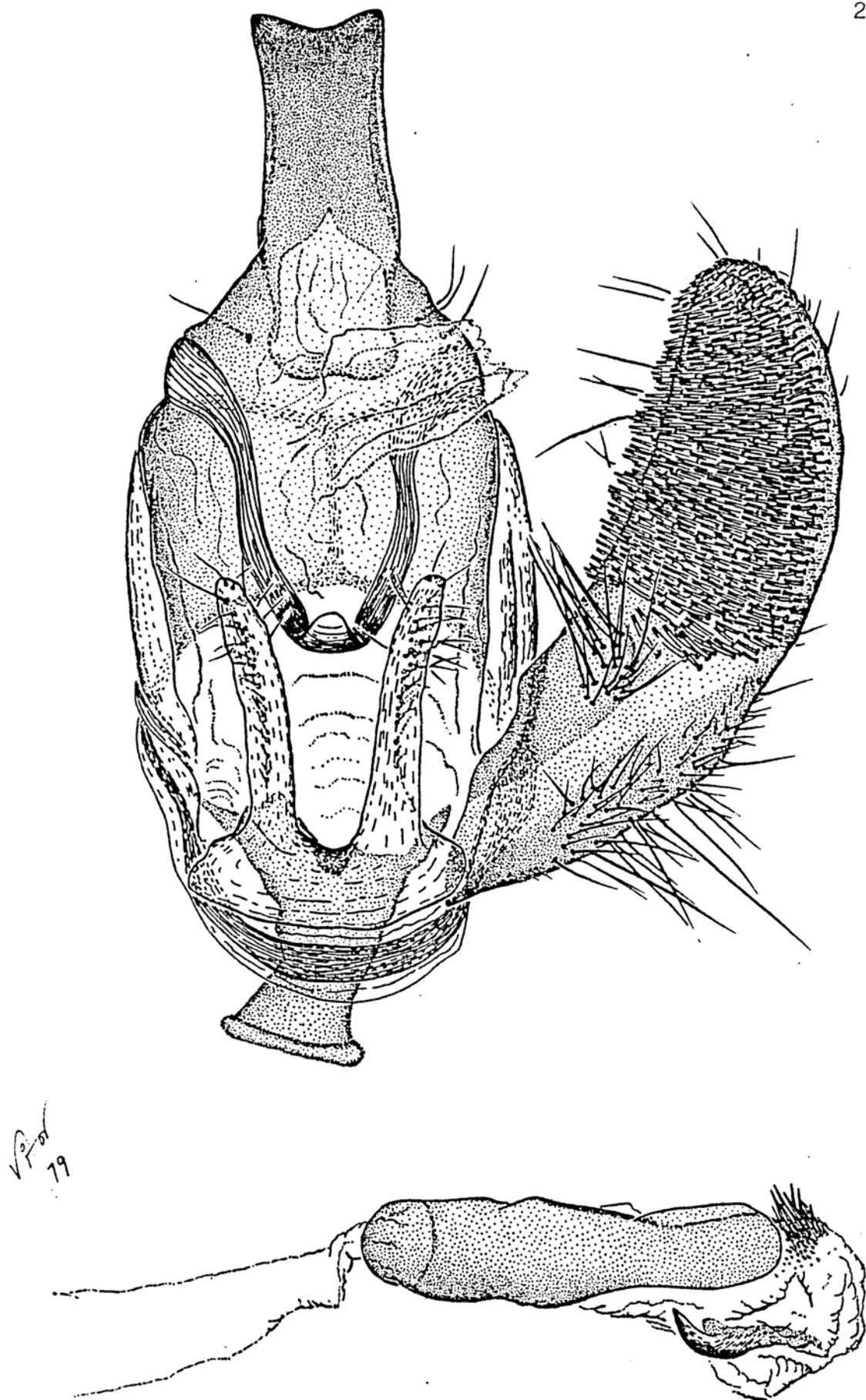


Fig. 121 Genitalia of Timocratica albitogata sp. n., ♂, paratype, Brazil (slide no. 517; colln V. Becker, Brazil).

REMARKS. T. albitogata is very close to palpalis, but usually larger. Like melanocosta, it can easily be distinguished from palpalis by the white underside of the fore wings and the white dorsal side of the fore tarsi. It differs from melanocosta by the larger size, white fore wing costa and ochreous hind tarsi.

BIOLOGY. Moths have been collected in January-march and December.

DISTRIBUTION (Fig. 126). Southeast Brazil. This species appears to be restricted to the Subtropical Region of South America. The localities where the type-series was collected are in the Subtropical Moist forest, Subtropical Lower Montane Moist Forest and Subtropical Lower Montane Wet Forest. It can be expected to occur further south, in the Warm Temperate Moist Forest of Rio Grande do Sul and possibly in Uruguay and Argentina.

MATERIAL EXAMINED.

25 ex. (21 ♂, 4 ♀; 3 ♂, 2 ♀ genitalia preparations).

Holotype ♂, Brazil: Paraná, Curitiba, 920m, 10.ii.1975 (Becker, no. 16076) (MN, Rio de Janeiro).

Paratypes. Brazil: 17 ♂, 4 ♀, Paraná, Curitiba, 920m, xii.1974-ii.1975 (Becker, nos 16064-16077) (colln v. Becker, Brazil; BMNH; NMNH, Washington; NM, Viena; MNHU, Berlin; ZSBS, Munich); 2 ♂, Mato Grosso, Rio Brilhante, 25.i.1971 (Becker) (colln v. Becker, no. 16088); 1 ♂, Rio de Janeiro, [? Itatiaia] (Zikán) (NMNH, Washington).

Timocratica melanostriga sp. n.

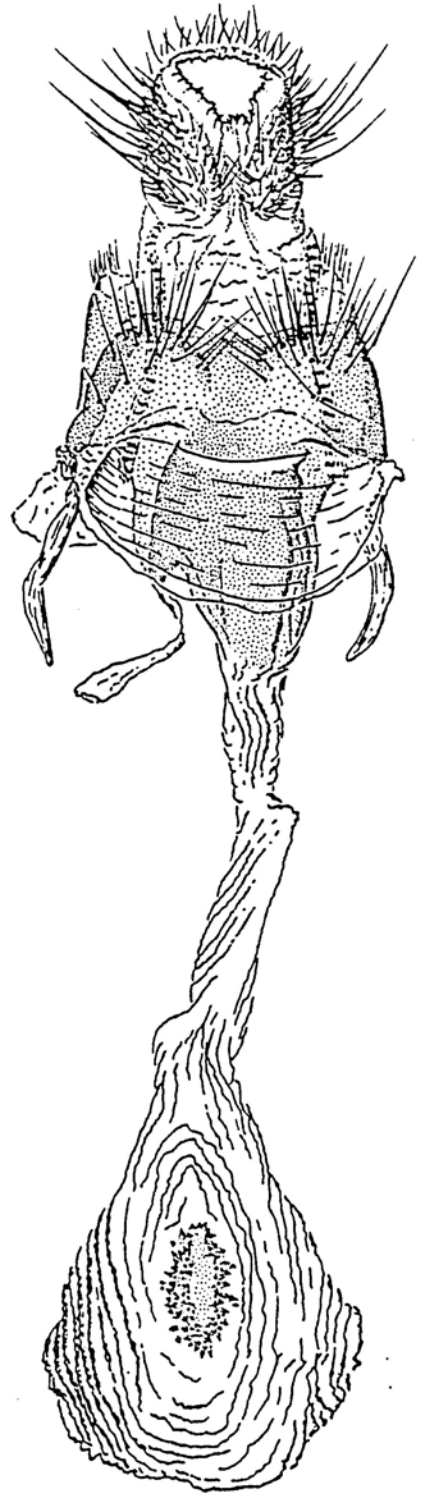
(Figs 89, 122, 126)

♀ 21mm. Frons white. Second segment of labial palpi golden-ochreous except distal half above and around distal articulation; third segment dark grey with a few white scales basally. Antennae dark fuscous, scape and base of flagellum white. Fore coxae, femora and tibiae golden-ochreous, distal third of tibiae except articulations dark greyish fuscous; tarsi dark greyish-fuscous, ochreous on articulations; distal half of middle femora ochreous below, tinged with grey externally at middle; middle tibiae fuscous with ochreous scales above, tarsi fuscous with ochreous scales; hind tarsi below ochreous with fuscous scales. Thorax and abdomen white with a dark grey line dorsally along middle. Fore wings with costa gently arched, apex rounded, termen and tornus oblique-rounded; veins free; basal half of veins R_3-M_3 , $1A+2A$, fold and middle of cell dashed with dark greyish-fuscous; white underneath, same veins marked with fuscous. Hind wings with veins and dorsal half of cell fuscous.

Genitalia ♀ (Fig. 122). Margin of ostium bursae slightly expanded posteriorly, concave at middle. Antrum slightly constricted after insertion of ductus seminalis, anterior two-thirds narrowing slightly towards ductus bursae, walls scobinated and wrinkled longitudinally. Ductus bursae widening progressively towards corpus bursae. Corpus bursae pear-shaped, walls as in ductus bursae, finely scobinated. Signum a small, irregular plate.



122



123

Figs 122-123 Genitalia of Timocratica ♀. 122, T.
melanostriга sp. n., holotype, Brazil
 (slide no. 2016, Duckworth; NMNH, Washington).
 123, T. albitogata sp. n., paratype, Brazil
 (slide no. 520; colln v. Becker, Brazil).

REMARKS. T. melanostriga is the only white Timocratica species with dark markings on the wings. The female genitalia, mainly the shape of the ostium, put this species close to palpalis and its allies; however its correct position cannot be ascertained until males are known.

BIOLOGY. Unknown.

DISTRIBUTION (Fig. 126). Brazil. The only specimen was collected in the lowlands on the coast of Santa Catarina, which is in the Subtropical Moist Forest, transition to Warm Temperate Moist Forest.

MATERIAL EXAMINED.

Holotype ♀, Brazil: Santa Catarina (Hoffmann) (genitalia slide 2016, Duckworth; NMNH, Washington; no. 76657).

Timocratica isarga (Meyrick)

(Figs 124, 126)

Stenoma isarga Meyrick, 1925, Exot. Microlepidopt. 3:224.

Holotype ♀, BOLIVIA: Santa Cruz, Prov. del Sara, 450m,
xi (Steinbach) (genitalia slide 5493, Clarke; BMNH)
[examined].

Timocratica isarga (Meyrick); Busck, 1935:17 [catalogue];
Clarke, 1955:388; pl. 194, figs 3-3c [adult, genitalia].

♀ 19mm. Frons white. Basal half of second segment of labial palpi tinged with ochreous externally and with dark fuscous above, white internally; third segment dark fuscous with white scales basally. Fore coxae below and basal half of tibiae above ochreous; fore femora above, distal half of tibiae, and tarsi dark fuscous with few white scales on articulations; articulations of middle femora, near tibiae, tinged with golden-yellow. Fore wings with basal third of costa arched, distal two-thirds nearly straight; apex rounded, slightly angled, termen and tornus oblique-rounded; CuA_1 and CuA_2 shortly stalked; white below. Hind wings and abdomen white.

Genitalia ♀ (Fig. 124). Margin of ostium bursae evenly concave. Antrum widened posteriorly, abruptly narrowed at middle, anterior half with margins nearly parallel, wrinkled longitudinally. Ductus bursae broadening progressively towards corpus bursae. Corpus bursae pear-shaped; walls, as in ductus bursae, plain. Signum an elongate plate without spines along middle.



Figs 124-125 Genitalia of Timocratica ♀. 124, T. isarga
 (Meyrick), holotype, Bolivia (slide no.
 5498, Clarke; BMNH). 125, T. argonais
 (Meyrick), holotype, Brazil (slide no.
 5497, Clarke; BMNH).

REMARKS. T. isarga is very similar to palpalis, melanocosta and nivea, but easily distinguished from the first by the stalked CuA_1 and CuA_2 , the plain white underside of the fore wings and white hind tarsi. From the other two by the fuscous fore tarsi. The genitalia are very similar to those of melanocosta, from which, however, it differs by the costa of the fore wings. T. nivea has no yellow on the palpi and legs. Clarification of the relationship of isarga within the group depends upon the discovery of males.

BIOLOGY. The holotype was collected in November.

DISTRIBUTION (Fig. 126). Bolivia (Eastern side of the Andes); in the Warm Temperate Moist Forest. According to Dr. Holdridge (in litt.) this area is affected periodically by frost, resulted from cold air masses which came from Antarctica, and is colder than would be suggested by the mean annual temperature. According to the meteorological data it should be classified as Tropical Premontane Dry Forest, transition to Subtropical Moist forest.

MATERIAL EXAMINED.

Known only from the holotype.

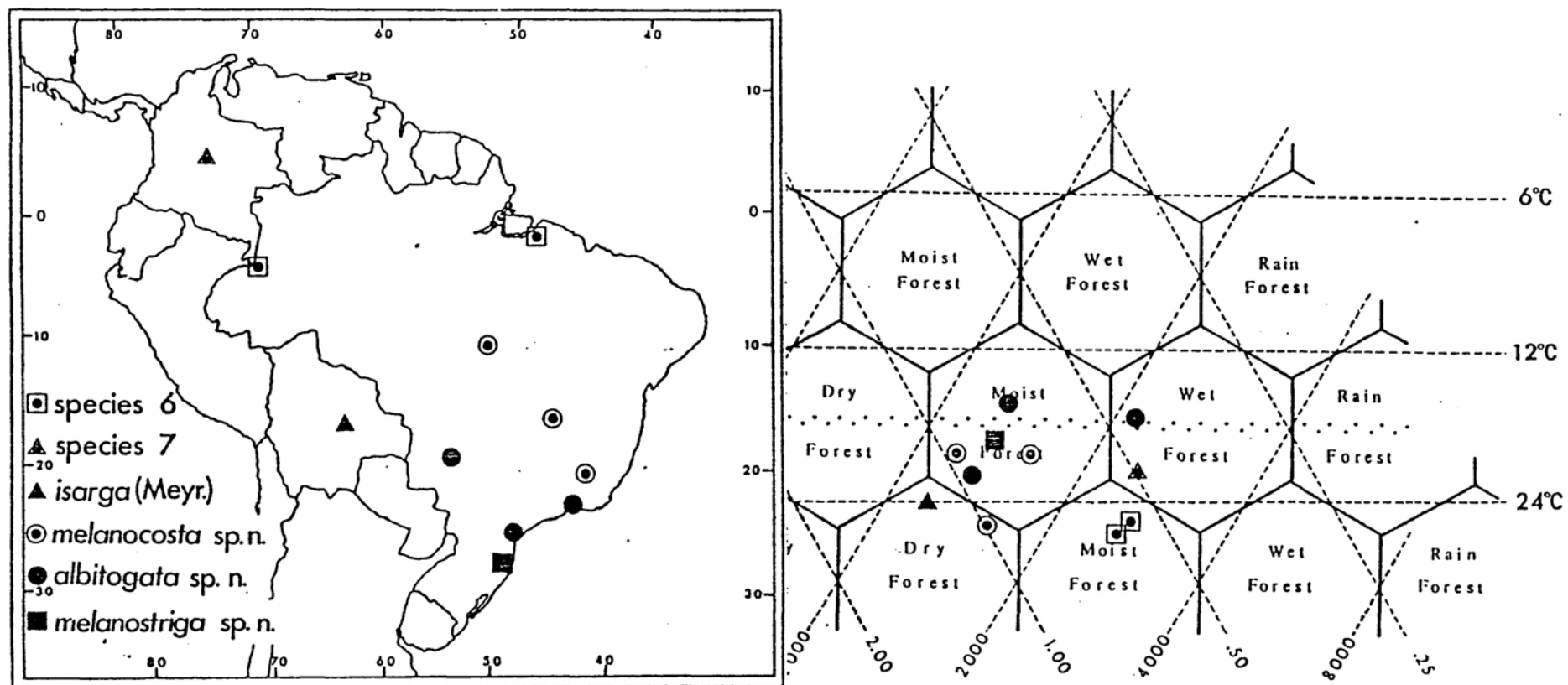


Fig. 126 Geographical and ecological distribution of the albella-complex of Timocratica.

Timocratica albella (Zeller)

(Figs 127, 130, 138)

Depressaria (Volucra) albella zeller, 1839, Isis, Leipzig 1839:197. Holotype ♀, SURINAM: No locality (genitalia slide 21226, Becker; BMNH) [examined].

Cryptolechia albella (Zeller); Zeller, 1854:377

[redescription]; Walker, 1864:713 [catalogue].

Timocratica albella (Zeller); Busck, 1935:16 [catalogue].

♀ 17mm. Frons white. Second segment of labial palpi tinged with golden-yellow below, basal half tinged with fuscous above, white internally; third segment white externally, dark fuscous internally. Fore tarsi white above; fore coxae below, femora and basal half of tibiae above golden-yellow, distal half of tibiae, and tarsi dark fuscous below; middle and hind legs white. Fore wings with costa gently arched, apex angled, termen and tornus oblique-rounded; veins free; costa golden-yellow below. Hind wings white. Abdomen with second to fourth tergites tinged golden-yellow.

Genitalia ♀ (Fig. 130). Ostium bursae wide, expanded posteriorly, concave at middle. Antrum very wide, funnel-shaped, anterior half with a few wrinkles. Ductus bursae broadening progressively towards corpus bursae, walls finely scobinated. Corpus bursae pear-shaped. Signum a long, transverse plate, concave across middle.

REMARKS. T. albella is very similar externally to nivea and guarani but easily distinguished from the former by the yellow tinge on its abdomen, fore legs, palpi and underside of the fore wing costa. From guarani it can be separated by the white head. The female genitalia are distinct from others in the group by the very broad antrum and the expansion of the margin of the ostium bursae. However, the relationship of this species within the group must remain unknown until males are discovered.

The name 'albella' is mentioned in the Brazilian literature at least fifty times, although, the species is known only from the holotype. All other references are based on misidentifications, probably through following Bondar (1913) and Lima's catalogues (1928, 1936, 1945). Most of those records apply to palpalis.

BIOLOGY. Unknown.

DISTRIBUTION (Fig. 138). Surinam; probably from Paramaribo which is in the Tropical Moist Forest.

MATERIAL EXAMINED.

Known only from the holotype.



Fig. 127 Timocratica albella (Zeller), ♀, holotype,
Surinam (BMNH).



Fig. 128 Timocratica guarani sp. n., ♂, holotype,
Argentina (BMNH).

Timocratica guarani sp. n.

(Figs 128, 129, 138)

♂ 12-14mm. Frons white, edged with fuscous and few ochreous scales. Basal two-thirds of second segment of labial palpi ochreous externally, dark grey above, distal third and internally white; third segment dark fuscous with white scales basally. Fore coxae, femora and tibiae ochreous below; distal half of tibiae, and t arsi white above, dark fuscous below; distal articulations of middle and hind femora tinged with golden-ochreous. Fore wings with costa gently arched, apex somewhat angled, termen and tornus oblique-rounded; veins free, CuA_1 and CuA_2 very close basally in some specimens; underside golden-ochreous above cell. Hind wings white. Abdomen slightly tinged with cream-yellow dorsally.

Genitalia ♂ (Fig. 129). Uncus with lateral margins nearly parallel, apical third with long sparse setae in some specimens, apex strongly concave. Apex of gnathos broadly rounded. Digitate processes of juxta with basal half broad, distal half narrow, covered with long sparse setae. Basal half of valvae with margins nearly parallel, then narrowing progressively towards apex, sacculus slightly expanded. Aedeagus bent basally, vesica with strong bent cornutus and many acute spines of different sizes opposite.

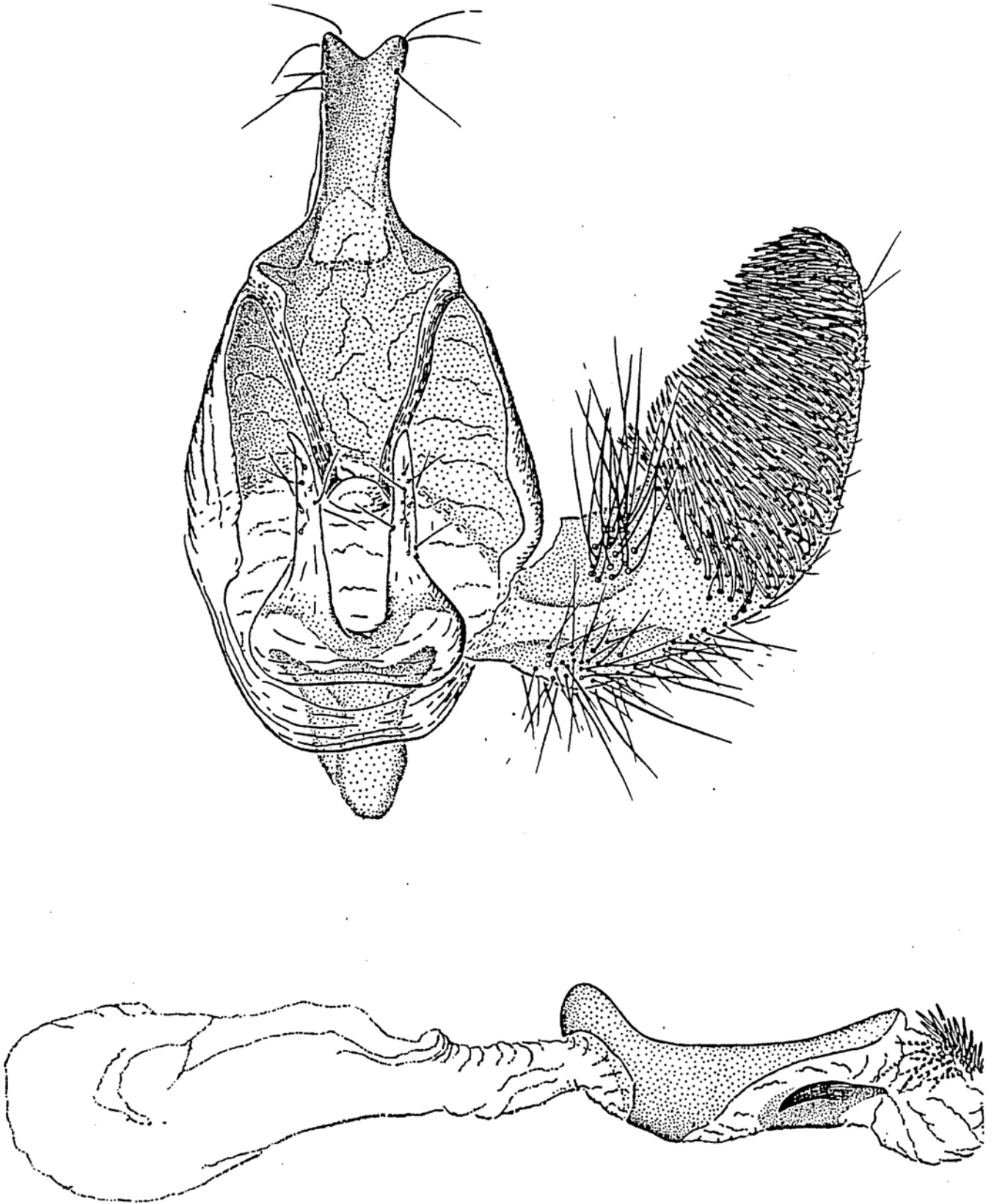


Fig. 129 Genitalia of Timocratica guarani sp. n., ♂, holotype, Argentina (slide no. 21029; BMNH).

REMARKS. T. guarani is externally very similar to albella, but their relationship cannot be clarified until males of the latter are discovered. It differs from other white species from Southern South America by the white fore tarsi and yellow-tinged abdomen, and from albella by the frons edged with fuscous.

BIOLOGY. Moths have been collected in February.

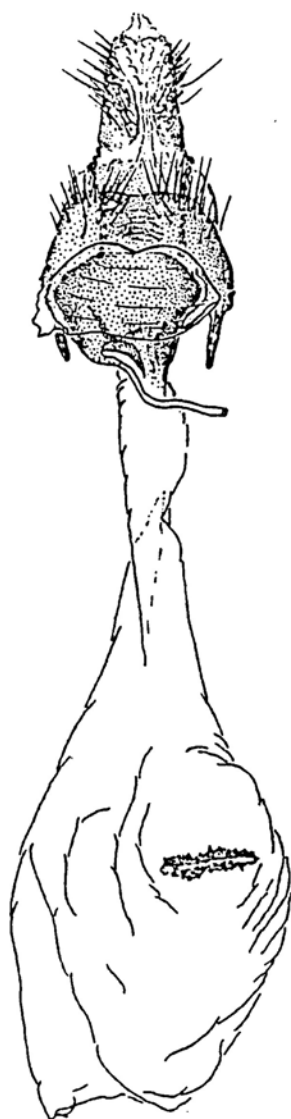
DISTRIBUTION (Fig. 138). North Argentina and Paraguay. It appears that this is the only species restricted to the warm Temperate Dry Forest. The only other species recorded from the same region is palpalis (collected by Hayward in Villa Ana), which, however, is not restricted to it.

MATERIAL EXAMINED.

3 ♂ (2 genitalia preparations).

Holotype ♂, Argentina: Santa Fé, Villa Guillermina, 20. ii. 1925 (Hayward) (genitalia slide 21019, Becker; BMNH).

Paratypes. Argentina: 1 ♂, Santa Fé, Villa Ana, ii. 1924 (Hayward) (BMNH). Paraguay: 1 ♂, Paraguay Central, 1885 (Germain) (BMNH).



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Figs 130-131 Genitalia of Timocratica ♀. 130, T. albella (Zeller), holotype, Surinam (slide no. 21226; BMNH). 131, T. butyrota (Meyrick), Costa Rica (slide no. 555; colln V. Becker, Brazil).

Timocratica philomela (Meyrick)

(Figs 132, 138)

Stenoma philomela Meyrick, 1925, Exot. Microlepidopt. 3:224.

Holotype ♂, PERU: Loreto, Yurimaguas, iii.1920 (Parish)
(genitalia slide 5499, Clarke; BMNH) [examined].

Timocratica philomela (Meyrick); Busck, 1935:17 [catalogue];
Clarke, 1955:391; pl. 195, figs 3-3b [adult, genitalia].

♂ 10mm. Head white, edged with fuscous. Second segment of labial palpi ochreous below, basal two-thirds dark fuscous above, distal third above and internally white; third segment white, fuscous towards apex. Antennae fuscous, scape white. Fore coxae below, femora and basal half of tibiae above, and tarsi dark fuscous. Hind tarsi golden-ochreous. Fore wings with costa gently arched, apex, termen and tornus evenly rounded; veins free; underside golden-yellow, slightly tinged with fuscous along apex. Hind wings tinged with cream-yellow. Abdomen white.

Genitalia ♂ (Fig. 132). Uncus wide, basal half slightly constricted; apex strongly concave. Apex of gnathos wide, triangular. Digitate processes of juxta long, broadened basally, narrowing progressively towards apex, few setae at distal half dorsally. Valvae slightly constricted basally, dorsal margin nearly straight, ventral margin evenly rounded. Aedeagus bent ventrad, vesica with strong bent cornutus and many spines opposite.

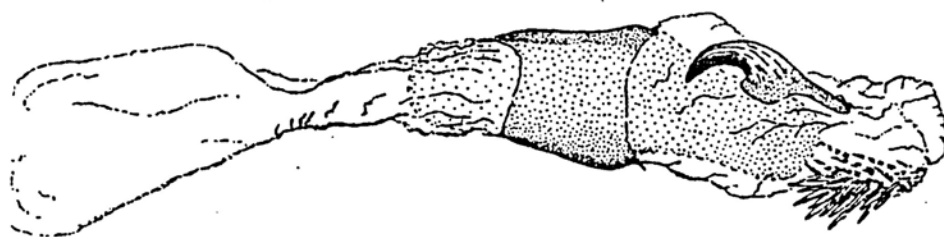
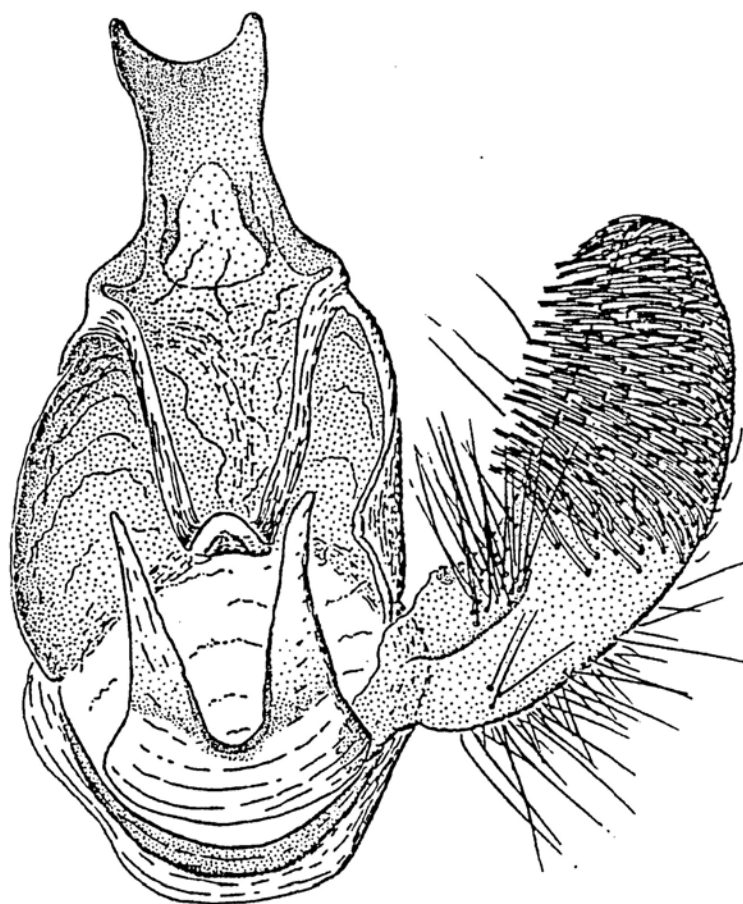


Fig. 132 Genitalia of Timocratica philomela (Meyrick),
♂, holotype, Peru (slide no. 5499, Clarke; BMNH).

REMARKS. T. philomela is a small species similar to butyrota and parvileuca but easily distinguished by the ochreous colour of the labial palpi.

BIOLOGY. The holotype was collected in March.

DISTRIBUTION (Fig. 138). Peru (Amazonian side of the Andes), in the Tropical Moist Forest.

MATERIAL EXAMINED.

Known only from the holotype.

Timocratica parvileuca sp. n.

(Figs 133, 138)

♂ 9-10mm. Frons white, edged with fuscous. Second segment of labial palpi fuscous, white internally; third segment white, few fuscous scales internally towards apex. Antennae cream-yellow, scape white. Thorax cream-yellow. Fore coxae tinged with fuscous below; femora and tibiae above, and tarsi dark fuscous; middle and hind legs light golden-yellow. Fore wings sub-oval, costa gently arched, apex, termen and tornus evenly rounded; veins free; golden-yellow below. Hind wings and abdomen cream-yellow.

Genitalia ♂ (Fig. 133). Uncus narrow, basal half slightly broadened. Apex of gnathos long, narrow. Digitate processes of juxta long, narrow, distal half with several setae dorsally. Valvae with margin nearly parallel or somewhat broadened at middle, dorsal margin nearly straight or somewhat bent basally, ventral margin evenly rounded. Aedeagus strongly bent ventrad, vesica with strong short cornutus and many small spines.

REMARKS. T. parvileuca, one of the smallest species in the genus, is very similar to butyrota and philomela but easily distinguished from the former by the numerous spines of the vesica, and from the latter by the lack of ochreous coloration of the palpi. Although it is the closest species to butyrota it seems to present less variation in wing venation.

BIOLOGY. Unknown.

DISTRIBUTION (Fig. 138). Brazil (Plateau of Paraná and São Paulo), in the Subtropical Lower Montane Forest, a different Life zone from that of its nearest related species, butyrota.

MATERIAL EXAMINED.

4 ♂ (2 genitalia preparations).

Holotype ♂, Brazil: São Paulo, São Paulo (Jones) (genitalia slide 21003, Becker; BMNH).

Paratypes. Brazil: 2 ♂, São paulo, São Paulo (Jones) (BMNH); 1 ♂, Paraná, Castro (Jones) (BMNH).

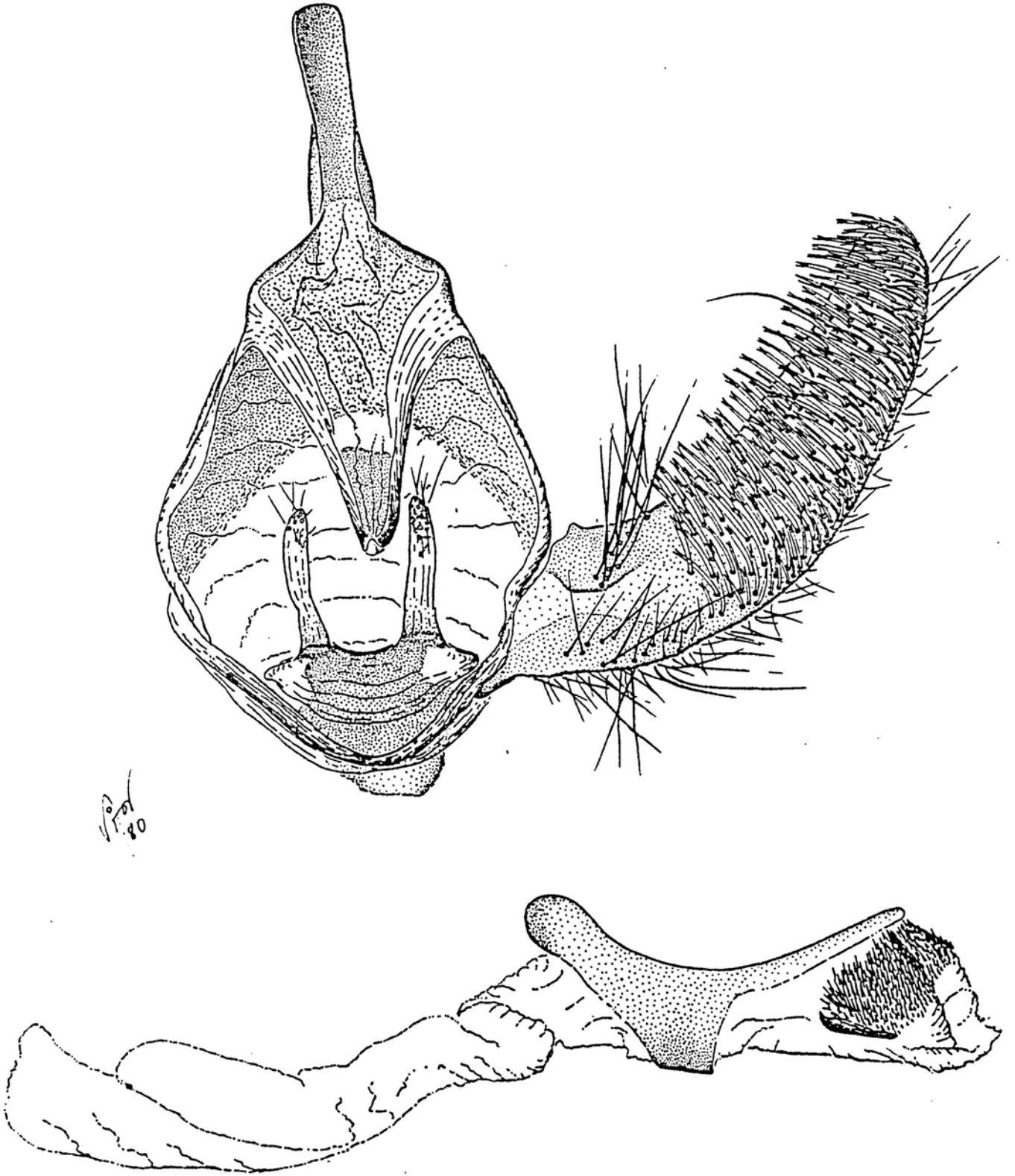


Fig. 133 Genitalia of *Timocratica parvileuca* sp. n., ♂, paratype, Brazil (slide no. 21021; BMNH).

Timocratica butyrota (Meyrick) comb. n.

(Figs 58-61, 131, 134, 136, 138)

Stenoma butyrota Meyrick, 1929, Trans. ent. Soc. Lond.76:516. Holotype ♂, COLOMBIA: Cauca, Gorgona Island, 60m ('200 ft'), 7.x.1924, (Collenette) (genitalia slide 5577, Clarke; BMNH) [examined].Stenoma syndicastis Meyrick, 1929, Trans. ent. Soc. Lond.76:516. Holotype ♂, COLOMBIA: Cauca, Gorgona Island, 60m ('200 ft'), 7.vii.1924 (Collenette) (genitalia slide 5593, Clarke; BMNH) [examined]. Syn n.Stenoma butyrota Meyrick; Busck, 1935:35 [catalogue];

Clarke, 1955:276; pl. 138, figs 1-1c [adult, genitalia].

Stenoma syndicastis Meyrick; Busck, 1935:58 [catalogue].Timocratica syndicastis (Meyrick); Clarke, 1955:392; pl.

196, figs 1-1b [adult, genitalia].

♂ 9-13mm, ♀ 14-17mm. Frons white, edged with fuscous.

Second segment of labial palpi dark fuscous, white internally and at distal articulation; third segment white in males,

dark fuscous in females. Antennae fuscous, scape white.

Fore coxae fuscous below, femora and basal half of tibiae golden-ochreous above, distal half of tibiae, and tarsi dark fuscous; middle legs golden-yellow above; hind tarsi golden-yellow. Fore wings sub-oval, costa rounded, apex, termen and tornus evenly rounded; veins free or R_4 and R_5 , and CuA_1 and CuA_2 respectively stalked or connate; underside golden-yellow, fuscous or white along apex and termen. Hind wings



Fig. 134 Timocratica butyrota (Meyrick), ♂, Costa Rica
(colln V. Becker, Brazil, no. 3960).



Fig. 135 Timocratica parvifusca sp. n., ♂, holotype,
Costa Rica (BMNH).

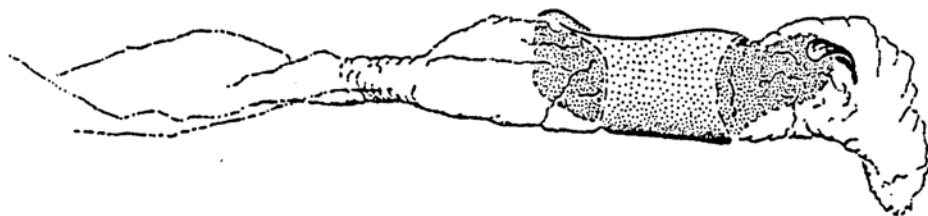
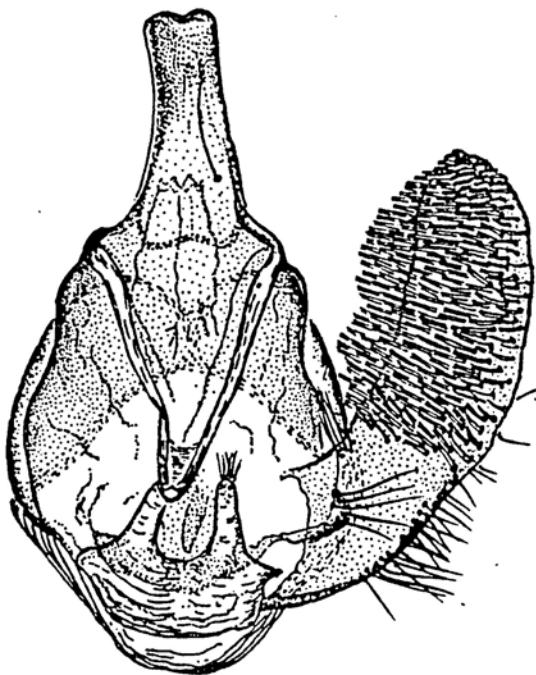
tinged with cream-yellow. Second to sixth abdominal tergites cream-yellow.

Genitalia ♂ (Fig. 136). Lateral margins of uncus nearly parallel or slightly convergent towards apex; apex slightly concave to slightly convex. Apex of gnathos narrow. Digitate processes of juxta short, laterally compressed, with short setae dorsally. Valvae with lateral margins nearly parallel, evenly rounded, or broadened at middle; ampulla slightly pronounced. Aedeagus bent ventrad, vesica with strong, short cornutus.

Genitalia ♀ (Fig. 131). Margin of ostium bursae straight or slightly convex. Antrum wide, short, with few wrinkles anteriorly. Ductus and corpus bursae not differentiated, forming a long, wide sac. Signum a long, irregular plate.

REMARKS. T. butyrota is very similar to philomela and parvileuca, but easily distinguished from the former by the lack of ochreous coloration on the palpi, and from the latter by the absence of spines in the vesica.

The venation of the fore wings is very variable in this species, as it is in nivea. Some specimens have all the veins free, others have R_4 and R_5 , and CuA_1 and CuA_2 respectively connate or stalked, and some have R_4 and R_5 stalked very close to apex (Figs 58-61). These two veins can be completely fused, and this is the case in the holotype of syndicastis, which has only eleven veins in the fore wings. Variation occurs even within the same locality. In a large series from Turrialba, Costa Rica, specimens



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Fig. 136 Genitalia of Timocratica butyrota (Meyrick), ♂,
Costa Rica (slide no. 553; colln V. Becker, Brazil).

with all the above combinations were found.

The absence of a differentiated ductus bursae in this species is also unique within the genus.

BIOLOGY. Moths have been collected in February to May, July, and October to December. They fly probably throughout the year.

DISTRIBUTION (Fig. 138). Costa Rica, Colombia and Peru. No climatic data could be obtained for Gorgona Island, the type-locality to establish the Life Zone. However, as suggested by other localities it probably is the Tropical Moist Forest or the Tropical Premontane Wet Forest.

MATERIAL EXAMINED.

79 ex. (69 ♂, 10 ♀; 6 ♂, 2 ♀ genitalia preparations).

Costa Rica: 61 ♂, 10 ♀, Cartago, Turrialba, 600m, 6-15.vii, 10.xi.1971; 10.ii, 4-20.v.1972; 10-20.iv.1973 (Becker, nos 3957-3974, 24269, 24790) (colln V. Becker, Brazil; BMNH; LN, Karlsruhe; MNHU, Berlin; NM, Vienna; NMNH, Washington; ZSBS, Munich). Panama: 5 ♂, Canal Zone, Barro Colorado Island, 10.x-12.xii.1934 (Bates) (NMNH, Washington). Peru: 1 ♂, Puno, Carabaya, La Oroya, Rio Inambari, 1000m ('3100 ft'), iii.1905 (Ockenden) (BMNH).

Timocratica parvifusca sp. n.

(Figs 62, 135, 137, 138)

♂ 9mm. Head fuscous. Second segment of labial palpi dark fuscous with dark grey scales externally, whitish internally; third segment light fuscous, whitish basally. Antennae dark fuscous. Thorax dark fuscous. Fore coxae and femora light fuscous, fore tibiae and tarsi dark fuscous; middle tibiae and tarsi ochreous; tarsi tinged with fuscous distally. Fore wings nearly oval; apex, termen and tornus evenly rounded; veins R_4 and R_5 , CuA_1 and CuA_2 respectively stalked, M_1 missing; dark fuscous, costa ochreous below. Abdomen fuscous above, whitish below.

Genitalia (Fig. 137). Uncus broad, lateral margins nearly parallel, slightly broadened at middle. Apex of gnathos long, narrow, pointed. Digitate processes of juxta slightly broadened at middle, gently curved dorsad. Aedeagus strongly curved ventrad, vesica with long curved cornutus.

REMARKS. T. parvifusca is similar externally to fraternella, differing from it by the smaller size, stalked R_4 and R_5 , the lack of M_1 and the absence of the oblique fasciae of the fore wings.

Despite its colour-pattern, which does not agree with that of any species of the albella-group, there is no doubt that it belongs here. The shape of the genitalia, wings and venation, as well as its geographic and ecologic distribution, indicate that it is very close to butyrota, if not a melanic form of this.

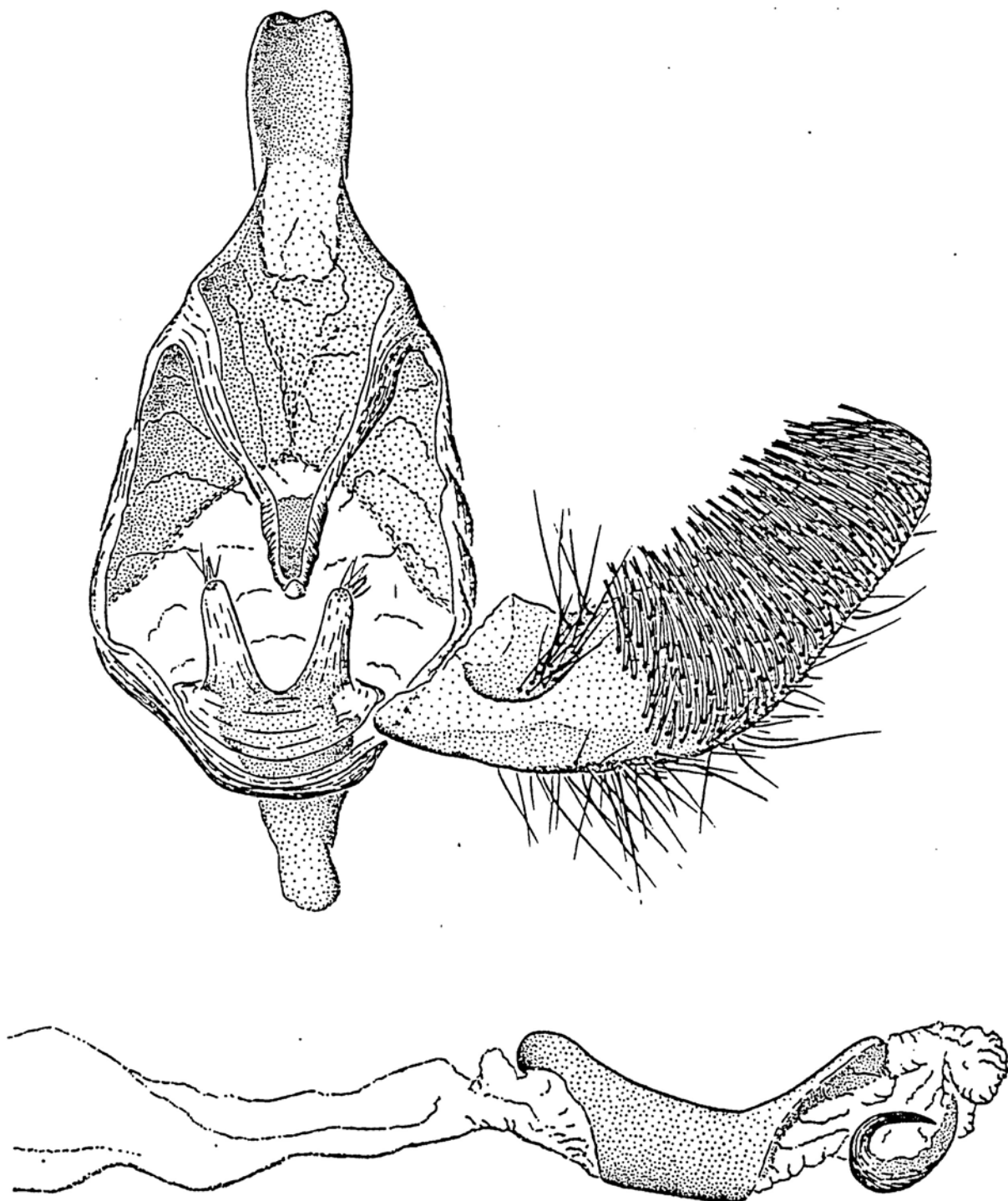


Fig. 137

Fig. 137 Genitalia of Timocratica parvifusca sp. n., ♂, holotype, Costa Rica (slide no. 21227; BMNH).

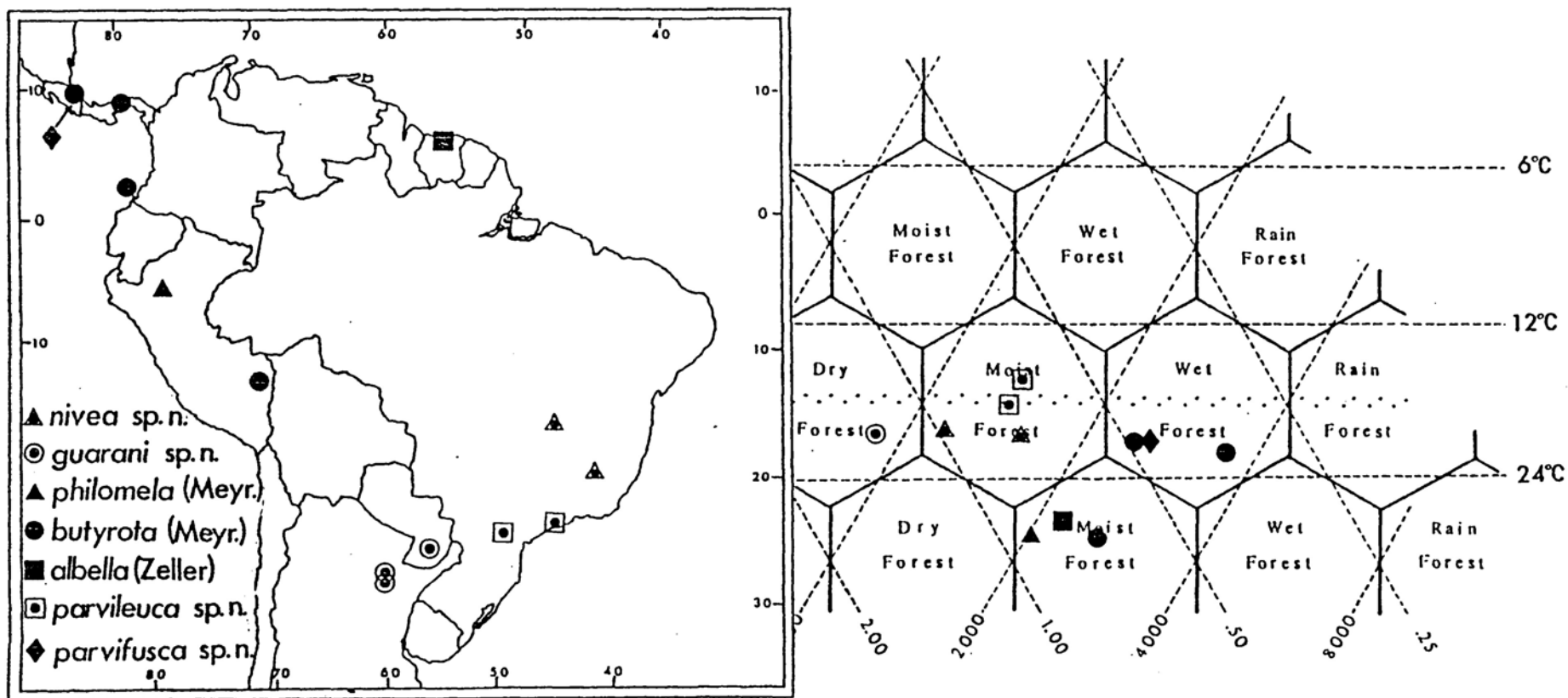


Fig. 138 · Geographical and ecological distribution of the *albella*-complex of *Timocratica*.

BIOLOGY. The holotype was collected in July.

DISTRIBUTION (Fig. 138). Costa Rica, in the Tropical Premontane Wet Forest.

MATERIAL EXAMINED.

Holotype ♂, Costa Rica: Cartago, Turrialba, 600m, 5.vii.1971 (Becker, no. 24252) (genitalia slide 21227, (BMNH)).

Species transferred from Timocratica

The following species have been previously included in Timocratica but do not belong to this genus. They are here provisionally transferred to Stenoma Zeller, although none of them seems to be congeneric with litura Zeller, the type-species.

S. litura, the type-species of Stenoma, is represented only by the holotype female in the BMNH. Since the characters of female Stenominae are inadequate for generic divisions, the relationship of litura with other species in the subfamily cannot be established with confidence. It is very likely that it is congeneric with griseana Fabricius, the type-species of Antaeotricha Zeller. If this proves true, most of the species now in Antaeotricha should be referred to Stenoma, and most of the species now in Stenoma should be transferred to other genera, most of these still to be defined. This would involve more than one thousand

new combinations. The decision to sink Antaeotricha under Stenoma, and the erection of new genera to accomodate the species now in this genus should be taken only after more knowledge about the group is gathered, and possibly not before the male of litura is known.

Stenoma completella (Walker)

Cryptolechia completella Walker, 1864:718.

This species was included in Timocratica by Busck (1935:16) and later transferred to Stenoma by Duckworth (1962:113). The type-series has been examined and is very close externally to Antaeotricha rhipidaula (Meyrick).

Stenoma convexicostata (Zeller) comb. n.

Cryptolechia convexicostata Zeller, 1877:272.

Stenoma liniella Busck, 1910:80. Syn. n.

Stenoma cantatrix Meyrick, 1925:221. Syn. n.

The holotypes of convexicostata and cantatrix, as well as a paratype of liniella in the BMNH, have been examined and there is little doubt that they represent the same species. This species is distributed from the gulf area of Mexico to South Brazil. The specimens examined show some variation in colour, some being darker than others, and in the female genitalia. However, the male genitalia are almost identical in specimens from different localities and of different colour-patterns.

Meyrick (1922:162), followed by Gaede (1939:259) included convexicostata in Hypercallia Stephens (Oecophoridae). S. cantatrix was transferred to Timocratica by Clarke (1955:387), and Duckworth (1962:113) transferred liniella to the genus, pointing out that their genitalia are atypical for Timocratica and that both might require a new genus.

Stenoma grandaeva (Zeller). comb. n.

Cryptolechia grandaeva Zeller, 1854:381.

Stenoma chrysogastra Meyrick, 1915:476. syn. n.

Although the type-specimen of grandaeva is in quite poor condition, with the abdomen, part of the antennae and most of the legs missing, there is no doubt that it is conspecific with the holotype of chrysogastra.

Busck (1935:16), who probably never examined the type of grandaeva may have included it in Timocratica on the account of its size.

Stenoma sexmaculata (Dognin) comb. n.

Cryptolechia sexmaculata Dognin, 1904:133.

Although this species has the ground colour of its fore wings white, the metallic blue-green dots, as well as its genitalia are atypical of Timocratica. Busck (1935:17) probably included sexmaculata in this genus on the basis of the white ground colour of the fore wings.

Stenoma staudingerana (Maassen) comb. n.

Tortrix staudingerana Maassen, 1890:171; pl. 9, fig. 29.

Stenoma contophora Meyrick, 1915:472. Syn. n.

Stenoma heterosema Meyrick, 1930: . Syn. n.

The holotype of staudingerana has not been traced. According to Horn and Kahle (1935:162, 272), the Stübel collection including the Maassen types, was deposited in MNHU, Berlin. Dr H.-J. Hannemann was unable to find it there (pers. comm.) and, according to Dr Gaedike it is not in the IP, Eberswalde (pers. comm.) either. However, from the excellent illustration which accompanies the description, there is no doubt that staudingerana represents the species later described by Meyrick as contophora and heterosema. This species is widely distributed in South America; in the BMNH collection there are specimens from Bolivia, Brazil, Peru, French Guiana and Surinam.

Busck (1935:17) included staudingerana in Timocratica, but the genitalia, which are very close to those of tristrigata (see below), exclude the species from that genus.

Stenoma tristrigata (Zeller) comb. n.

Cryptolechia tristrigata Zeller, 1854:382; pl. 3, fig. 21.

Stenoma aphanodesma Meyrick, 1915:478.

It was possible to examine the holotype of both names and, although they represent different sexes, there is no doubt that they belong to the same species.

Meyrick (1912:706), when erecting Timocratica, included tristrigata as possibly belonging to this genus. Busck (1935:17) retained it in Timocratica and, at the same time synonymized aphanodesma. This concept was retained by Clarke (1955:392).

The male genitalia of tristrigata are similar to those of staudingerana, and exclude both species from Timocratica.

Summary

1. The genus Timocratica was proposed by Meyrick in 1912 to include the type-species, isographa Meyrick, and tristrigata Zeller and major Busck. Meyrick in 1925 added three more species to the genus, and in 1926 described the genus Lychnocrates to accomodate leucocapna Meyrick. Although Meyrick also described most of the white species now in Timocratica, he never recognized them as congeneric with isographa, the type of the genus. Busck (1935) was the first to consider these white species, the species included by Meyrick in Lychnocrates and also those included in Timocratica as congeneric. Clarke (1955) removed Lychnocrates from synonymy with Timocratica.

Like most of the Neotropical Oecophoridae, the genus Timocratica has never been revised before. Its presumed monophyly was, therefore, still doubtful, and the identity of many of the described species still uncertain, including a complex of white species whose larvae damage the trunk of ornamental, fruit and timber trees in Brazil and Argentina. The accumulation of more material has also shown that many species were still undescribed and for these reasons a revision of the group was greatly needed.

2. The species of Timocratica show two basic colour-pattern; some have fuscous fore wings and golden-ochreous hind wings, while others have white fore wings and white or golden-yellow hind wings. The fuscous ones are probably

cryptic while the whites are probably aposematic. They presumably form a Batesian mimetic group whose models are species of the arctiid genus Agylla Walker. Field tests have shown that the white species of Agylla, a large, common and widely distributed group in South America, sympatric with Timocratica, are rejected by birds.

3. The genus Timocratica is confined to the Neotropical Region, ranging from the Gulf of Mexico in the North, to Northern Argentina in the South. According to Holdridge's system, the genus is ecologically restricted chiefly to three Life Zones: Tropical Moist Forest, Tropical Premontane Moist Forest and Tropical Premontane Wet Forest.

4. The genus Timocratica is monophyletic and presumably forms the sister-genus of the genus Loxotoma Zeller. It is composed of three, also monophyletic, species-groups: 1, the monotonia-group, which includes the fuscous species that have the fore wings with CuA_1 and CuA_2 stalked; 2, the leucocapna-group, which accommodates two or possibly three fuscous species which have the fore wings with all the veins free; and 3, the albella-group, the largest of the species-groups, which is composed of the white species. This division is based on a cladistic analysis, as shown in the cladogram (Fig. 3). It was, however, impossible to produce a sound arrangement of the species within each of the species-groups by the same methods. Because of this, an arrangement based on phenetic similarities is presented, following numerical methods (Figs 13, 14).

5. The larvae and pupae of two species, palpalis and melanocosta, are described and illustrated. They present generalized gelechioid characters and seem to be closely related to the Xyloryctinae. A list of their food-plants, recorded either by the author or the literature, is also given.

6. The genus Lychnocrates is considered a junior synonym of Timocratica. Forty seven species are recognized in the genus, including seven which are described and illustrated but not named due to lack of sufficient material. Seventeen new species are described: guarani (Argentina, Paraguay), agramma, albitogata, bicornuta, melanocosta, melanostriga, nivea, parvileuca, venifurcata (Brazil), meridionalis, (Bolivia, Brazil, Paraguay), longicilia (Colombia), parvifusca (Costa Rica), constrictivalva (Ecuador), xanthotarsa (Panama), spinignatha, titanoleuca (Peru), and iuscipalpalis (Venezuela). A new subspecies of xanthosoma: leucocephala (Colombia, Panama) is also described. T. amseli Duckworth is removed from the synonymy of xanthosoma (Dognin), and butyrota (Meyrick) comb. n., is transferred from Stenoma Zeller.

7. Seven names previously included in Timocratica are retained in Stenoma: completella (Walker), liniella Busck and cantatrix Meyrick (= convexicostata (Zeller) comb. n.), grandaeva (Zeller) comb. n., sexmaculata (Dognin) comb. n., staudingerana (Maassen) comb. n., and tristrigata (Zeller) comb. n.

8. Eleven new junior synonyms are recognized: syndicastis Meyrick (= butyrota (Meyrick)), haywardi Busck (= palpalis (Zeller)), stomatocosma Meyrick (= subovalis (Meyrick)), claudescens Meyrick, crassa Meyrick and isographa Meyrick (= monotonia (Strand)), liniella Busck and cantatrix Meyrick (= convexicostata (Zeller)), chrysogastra Meyrick (= grandaeva (Zeller)), and contophora Meyrick and heterosema Meyrick (= staudingerana (Maassen)).

9. The name of the white species, whose larvae damage the trunk and branches of ornamental, fruit and timber trees in Brazil and Argentina, and which is usually referred to in the Brazilian economic literature as Stenoma albella (Zeller) or Timocratica albella (Zeller) has been incorrectly used. T. albella is restricted to Surinam, and only the holotype specimen is known, whereas the other, of which the correct name is palpalis (Zeller), is restricted to the Eastern coast and South Brazil and Northern Argentina.

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A P P E N D I X

Table 2 Collecting localities of Timocratica, their altitude, geographic position, climatic data and their ecological position according to Holdridge's Life Zone system.

LOCALITY	Latitude	Longitude (West)	Altitude (m asl)	Annual Rainfall (mm)	Annual Mean Temperature (°C)	LIFE ZONE
ARGENTINA						
Entre Rios						
Concordia	31.23S	58.23	121	1,190	19.0	Warm Temperate Moist Forest
Santa Fé						
Villa Ana	28.28S	59.40				
(Villa Angela)	27.34S	60.44	74	910	21.0	Warm Temperate Dry Forest
Villa Guillermina	28.15S	59.29				
(Villa Ana)						
BOLIVIA						
La Paz						
Rio Zongo	15.47S	67.44	750			
(Alcoche)	15.43S	67.40	560	1,657	34.6	Subtropical Moist Forest
Santa Cruz						
Santa Cruz	17.48S	63.10	437	1,140	24.7	Subtropical Moist Forest
BRAZIL						
Alagoas						
Maceió	9.40S	35.42	150	1,650	25.4	Tropical Dry Forest, transition to Tropical Moist Forest

Table 2 (continuation)

Amazonas						
Benjamin Constant	4.23S	70.02				
(Fonte Boa)	2.32S	66.10	56	2,828	24.9	Tropical Moist Forest
Borba	4.39S	59.35	0-100			
(Manaus)	3.08S	60.01	48	2,121	26.7	Tropical Moist Forest
Fonte Boa	2.32S	66.10	56	2,828	24.9	Tropical Moist Forest
São Paulo de Olivença	3.34S	68.55	0-100			
(Fonte Boa)						Tropical Moist Forest
Tefé	3.22S	64.44	0-100			
(Fonte Boa)						Tropical Moist Forest
Bahia						
Salvador	12.57S	38.30	26	1,820	24.8	Tropical Moist Forest
Distrito Federal						
Planaltina	15.35S	47.42	1,000	1,574	21.3	Tropical Premontane Moist Forest
Espírito Santo						
Vitoria	20.10S	40.20	31	1,293	23.5	Tropical Dry Forest, transition to Subtropical Moist Forest
Goiás						
Bananal Island	11.30S	50.00	100-200			
(Conceição do Araguaia)	8.55S	49.12	100-200	1,687	25.5	Tropical Dry Forest
Leopoldo Bulhões	16.37S	48.45	±1,000			
(Goiania)	16.41S	49.17	1,290	1,501	21.9	Tropical premontane Moist forest

Table 2 (continuation)

Maranhão						
São Luis	2.32S	44.17	30	3,100	26.7	Tropical Moist Forest
Mato Grosso						
Rio Brilhante	21.48S	54.32	200-500			
(Campo Grande)	20.27S	54.37	566	1,456	22.4	Tropical Premontane Moist Forest
Minas Gerais						
Cordisburgo	19.07S	44.19				
(Sete Lagoas)	19.28S	44.15	717	1,221	20.7	Tropical Premontane Moist Forest
Leopoldina	21.32S	42.38	268	1,278	22.6	Subtropical Moist Forest
Sete Lagoas	19.28S	44.15	717	1,221	20.7	Tropical Premontane Moist Forest
Pará						
Belém	1,28S	48.27	24	2,788	25.9	Tropical Moist Forest
Ponte Nova	2.58S	52.05	0-100			
(Santarém)	2.25S	54.42	20	2,116	26.0	Tropical Moist Forest
Paraná						
Castro	24.47S	50.00	992	1,475	16.7	Warm Temperate Lower Montane Moist Forest
Curitiba	25.26S	49.16	920	1,426	16.5	Warm Temperate Lower Montane Moist Forest
Iguaçu	25.41S	54.26				
(Puerto Iguazu)	25.36S	54.34	158	1,451	20.2	Warm Temperate Moist Forest
Rio de Janeiro						
Itatiaia	22.25S	43.14	1,500	2,383	13.0	Subtropical Lower Montane Wet Forest
Rio de Janeiro	22.58S	43.14	56	2,780	22.0	Subtropical Wet Forest

Table 2 (continuation)

Rio Grande do Sul						
Guarani	28.08S	54.33				
(Santa Maria)	29.41S	53.48	138	1,706	19.2	Warm Temperate Moist Forest
Pelotas	31.45S	52.21	7	1,407	17.5	Warm Temperate Moist Forest
Santa Maria	29.41S	53.48	138	1,706	19.2	Warm Temperate Moist Forest
Santa Catarina						
Brusque	27.06S	48.56	24	1,826	19.7	Subtropical Moist Forest
Corupá						
(Blumenau)	26.55S	49.03	15	1,471	20.0	Subtropical Moist Forest
Jaraguá do Sul	26.29S	49.07	±30			
(Blumenau)	26.55S	49.03	15	1,471	20.0	Subtropical Moist Forest
São Paulo						
Piracicaba	22.43S	47.38	556	1,378	20.7	Subtropical Premontane Moist Forest
São Paulo	23.30S	46.37	790	1,438	18.4	Subtropical Lower Montane Moist Forest
COLOMBIA						
Antioquia						
Mesopotamia	5.51N	75.16	1,525			
(Sonson)	5.42N	75.18	2,500	2,021	14.8	Tropical Premontane Moist forest, trans. to Tropical Premontane wet Forest
Caldas						
Monte del Eden	4.35N	75.30	2,700			
(Manizales)	5.08N	75.28	2,710	2,210	12.8	Tropical Lower Montane wet Forest

Table 2 (continuation)

Cauca						
Popayán	2.27S	76.36	1,780	1,945	17.4	Tropical Lower Montane Moist Forest
Chocó						
Chocó	5.42N	76.38	73	7,194	25.9	Tropical Wet Forest, transition to Tropical Rain forest
Cundinamarca						
Medina	4.31N	73.21	500-1000	?	±22.0	Tropical Premontane Wet Forest
Bogotá	4.38N	74.06	2,560	948	14.2	Tropical Lower Montane Moist Forest
Guainia						
Rio Negro (Uaupés)	±2.00S 0.08S	±67.00 67.05	0-100 84	2,940	24.1	Tropical Moist Forest
Putumayo						
Mocoa	1.09S	76.37	?	?	?	?Tropical Premontane Moist Forest
COSTA RICA						
Cartago						
Juán Viñas	9.34N	83.44	1,165	3,760	21.1	Tropical Premontane Wet forest
Turrialba	9.53N	83.38	600	2,434	22.5	Tropical Premontane wet forest

Table 2 (continuación)

ECUADOR

Morona Santiago

Macas	2.22S	78.08	500-1000				
(Mendez)	2.43S	78.19	620	2,616	23.6	Tropical Premontane Wet Forest	

Pastaza

Sarayacu	1.44S	77.29	200-500			?Tropical Premontane Moist Forest	
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Pichincha

Santo Domingo de los Colorados	0.14S	79.04	660	3,191	22.0	Tropical Premontane Wet Forest	
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FRENCH GUIANA

Guyanne

Cayenne	4.57S	52.20	3	2,983			
(Rochambeau)	4.50S	52.50	8	3,672	26.1	Tropical Moist Forest	

St. Laurent du Maroni	5.30S	54.02	4	2,692	26.3	Tropical Moist Forest	
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GUATEMALA

Petén

Tikal	17.14N	89.38					
(Flores)	16.56N	89.53	112	2,025	25.4	Tropical Moist Forest	

GUYANA

Essequibo

Potaro	5.20N	59.05		3,847	25.5	Tropical Wet Forest	
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Table 2 (continuation)

MEXICO

Campeche

Escarcega	18.40N	90.44				
(Champoton)	19.21N	90.43	2	1,210	26.4	Tropical Dry Forest

Veracruz

Huatusco	19.09N	96.57	1,344	2,097	18.5	Subtropical Premontane Wet Forest, transition to Tropical Lower Montane Wet Forest
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Veracruz	19.12N	96.08	16	1,637	24.8	Subtropical Moist Forest
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S  n Luiz Potosi

Palitla						
(Xilitla)	21.24N	99.00	500-1000	2,561	20.8	Subtropical Moist Forest

Rancho Quemado						
(Xilitla)						Subtropical Moist Forest

Tamazunchale						
(Xilitla)	21.16N	98.47				Subtropical Moist Forest

PANAMA

Canal zone

Barro Colorado	9.10N	79.50	64	2,749	26.8	Tropical Moist Forest
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Table 2 (continuation)

PARAGUAY

Guairá

Sapucay (Villa Rica)	25.40S	56.55				Warm Temperate Moist Forest
Villa Rica	25.45S	56.26	155	1,553	22.3	Warm Temperate Moist Forest

PERU

Lima

Callao	12.05S	77.08				
(Lima)	12.02S	77.02	137	26	18.0	Subtropical Superarid Desert

Loreto

Iquitos	3.45S	73.15	117	2,753	25.0	Tropical Moist Forest
Pebas (Iquitos)	3.10S	71.49				Tropical Moist Forest
Yurimaguas	5.45S	76.05	179	2,021	26.8	Tropical Moist Forest

Puno

La Oroya	13.56S	69.41	915			
(Tingo Maria)	9.08S	75.57	686	3,443	22.5	Tropical Premontane Wet Forest
Sán Gabán (river) (Tingo Maria)						Tropical Premontane Wet Forest

Sán Martin

Chambirayacu	6.04S	76.15				
(Yurimaguas)	5.54S	76.05	179	2,021	26.8	Tropical Moist Forest

Table 2 (continuation)

SURINAM

Paramaribo

Paramaribo	5.51N	55.10		2,229	27.0	Tropical Moist Forest
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VENEZUELA

Bolívar

Auyán Tepui	5.48N	62.41	1,100			
(Sta. Helena)	4.36N	61.07	908	1,665	21.8	Tropical Premontane Moist Forest

Carabobo

Sán Esteban	10.26N	68.01				
(Rancho Grande)						Tropical Premontane Moist Forest

Distrito Federal

Caracas	10.30N	66.56	1,043	832	20.8	Tropical Premontane Dry Forest
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Falcón

Palma Sola	10.41N	68.32	0-100			
(Puerto Cabello)	10.30N	68.01	1.5	941	26.5	Tropical Dry Forest

Aragua

Rancho Grande	10.22N	67.41	1,126	1,848	20.0	Tropical Premontane Moist Forest
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DATA NOT STANDARDIZED

	1	2	3	4	5	6	7	8
1	1.0000	.5000	.5100	.5000	.6250	.5000	.5000	.3750
2	.5000	1.0000	.7500	.7500	.8750	.7500	.7500	.6250
3	.5000	.7500	1.0000	.7500	.8750	.7500	.7500	.6250
4	.5000	.7500	.7500	1.0000	.8750	.7500	.7500	.6250
5	.6250	.8750	.8750	.8750	1.0000	.8750	.8750	.7500
6	.5000	.7500	.7500	.7500	.8750	1.0000	1.0000	.8750
7	.5000	.7500	.7500	.7500	.8750	1.0000	1.0000	.8750
8	.3750	.6250	.6250	.6250	.7500	.8750	.8750	1.0000

MATRIX OF SIMILARITY/DISSIMILARITY COEFFICIENTS

Computer output of matrix of between-OTU Gower's coefficients for the monotonia-group of Timocratica, calculated from unstandardized data. (N. B. Standardization not possible because one species, monotonia, presents all characters in the plesiomorphic state, so that its standard deviation is zero).

DATA NOT STANDARDIZED

	1	2	3	4	5	6	7	8
1	1.0000	-.2928	-.2928	-.2928	I	-.2928	-.2928	-.4472
2	-.2928	1.0000	-.1429	-.1429	I	-.1429	-.1429	-.2182
3	-.2928	-.1429	1.0000	-.1429	I	-.1429	-.1429	-.2182
4	-.2928	-.1429	-.1429	1.0000	I	-.1429	-.1429	-.2182
5	I	I	I	I	I	I	I	I
6	-.2928	-.1429	-.1429	-.1429	I	1.0000	1.0000	.6547
7	-.2928	-.1429	-.1429	-.1429	I	1.0000	1.0000	.6547
8	-.4472	-.2182	-.2182	-.2182	I	.6547	.6547	1.0000

MATRIX OF SIMILARITY/DISSIMILARITY COEFFICIENTS

Computer output of matrix of between-OTU product-moment correlation coefficients for the monotonia-group of Timocratica, calculated from unstandardized data.

DATA STANDARDIZED BY ROWS (ZERO MEAN, UNIT S.D.)

	1	2	3	4	5	6	7	8
1	1.0000	-.2173	-.2173	-.2173	.3713	-.3713	-.3713	-.4452
2	-.2173	1.0000	-.3336	-.0836	.2668	-.2668	-.2668	-.2504
3	-.2173	-.0836	1.0000	-.0836	.2668	-.2668	-.2668	-.2504
4	-.2173	-.0836	-.0836	1.0000	.2668	-.2668	-.2668	-.2504
5	.3713	.2668	.2668	.2668	1.0000	-1.0000	-1.0000	-.3820
6	-.3713	-.2668	-.2668	-.2668	-1.0000	1.0000	1.0000	.3820
7	-.3713	-.2668	-.2668	-.2668	-1.0000	1.0000	1.0000	.3820
8	-.4452	-.2504	-.2504	-.2504	-.3820	.3820	.3820	1.0000

MATRIX OF SIMILARITY/DISSIMILARITY COEFFICIENTS

Computer output of matrix of between-OTU product-moment correlation coefficients
for the monotonia-group of Timocratica, calculated from standardized data.

DATA NOT STANDARDIZED

	1	2	3	4	5	6	7	8
1	1.0000	.7071	.7071	.7071	.6124	.7071	.7071	.7906
2	.7071	0.0000	.5000	.5000	.3535	.5000	.5000	.6124
3	.7071	.5000	0.0000	.5000	.3536	.5000	.5000	.6124
4	.7071	.5000	.5000	1.0000	.3535	.5000	.5000	.6124
5	.6124	.3535	.3535	.3535	0.0000	.3535	.3536	.5000
6	.7071	.5000	.5000	.5000	.3536	0.0000	0.0000	.3536
7	.7071	.5000	.5000	.5000	.3535	0.0000	0.0000	.3536
8	.7906	.6124	.6124	.6124	.5000	.3536	.3536	0.0000

MATRIX OF SIMILARITY/DISSIMILARITY COEFFICIENTS

Computer output of matrix of between-OTU taxonomic distance coefficients
for the monotonia-group of Timocratica, calculated from unstandardized data.

DATA STANDARDIZED BY ROWS (ZERO MEAN, UNIT S.D.)

	1	2	3	4	5	6	7	8
1	0.0000	2.0000	2.0000	2.0000	1.7321	1.8619	1.8619	2.1134
2	2.0000	0.0000	1.4142	1.4142	1.0000	1.2111	1.2111	1.5706
3	2.0000	1.4142	0.0000	1.4142	1.0000	1.2111	1.2111	1.5706
4	2.0000	1.4142	1.4142	0.0000	1.0000	1.2111	1.2111	1.5706
5	1.7321	1.0000	1.0000	1.0000	0.0000	.6831	.6831	1.2111
6	1.8619	1.2111	1.2111	1.2111	.6831	0.0000	0.0000	1.0000
7	1.8619	1.2111	1.2111	1.2111	.6831	0.0000	0.0000	1.0000
8	2.1134	1.5706	1.5706	1.5706	1.2111	1.0000	1.0000	0.0000

MATRIX OF SIMILARITY/DISSIMILARITY COEFFICIENTS

Computer output of matrix of between-OTU taxonomic distance coefficients for
monotonia-group of Timocratica, calculated from standardized data.

Computer output of matrix of between-OTU Gower's coefficient for the albella-group of Timocratica. The results calculated from standardized and unstandardized data were identical.

	1	2	3	4	5	6	7	8	9	10
1	1.0000	.8947	.9412	.8824	.8750	.5294	.6316	.5882	.7768	.9824
2	.8947	1.0000	.8235	.7647	.8750	.4118	.5263	.5882	.6316	.7647
3	.9412	.8235	1.0000	.9412	.9286	.4706	.5294	.5294	.7059	.9235
4	.8824	.7647	.9412	1.0000	.9286	.4118	.4706	.4706	.6471	.7647
5	.8750	.8750	.9286	.9286	1.0000	.4286	.4375	.4286	.5625	.7143
6	.5294	.4118	.4706	.4118	.4286	1.0000	.9235	.8235	.7647	.6471
7	.6316	.5263	.5294	.4706	.4375	.8235	1.0000	.8235	.7895	.7059
8	.5882	.5882	.5294	.4706	.4286	.8235	.8235	1.0000	.8235	.7059
9	.7368	.6316	.7059	.6471	.5625	.7647	.7895	.8235	1.0000	.9824
10	.8824	.7647	.8235	.7647	.7143	.6471	.7059	.7059	.8235	1.0000
11	.7333	.7333	.6154	.6154	.6000	.7692	.8667	.9231	.7333	.9402
12	.7647	.6471	.7059	.6471	.5714	.6471	.7059	.7059	.8824	.9824
13	.7647	.6471	.7059	.6471	.5714	.6471	.7059	.7059	.6471	.7647
14	.7647	.7647	.7059	.6471	.6429	.5294	.5882	.7059	.6471	.7647
15	.7895	.7895	.7059	.7647	.7500	.4118	.5263	.5882	.6316	.7647
16	.8421	.7368	.7347	.8235	.7500	.4706	.5789	.5294	.6842	.8235
17	.8125	.8125	.7357	.7857	.6875	.4286	.5000	.5714	.7500	.8571
18	.8750	.8750	.7357	.7857	.7500	.4286	.5625	.5714	.6875	.9571
19	.8947	.7895	.8235	.7647	.7500	.5294	.6316	.5882	.7368	.9824
20	.8125	.8125	.7357	.7857	.6875	.4286	.5000	.5714	.7500	.8571
21	.7835	.7895	.7347	.7059	.6875	.4706	.5263	.6471	.7768	.9235
22	.8125	.8125	.7357	.7857	.6875	.4286	.5000	.5714	.7500	.8571
23	.8235	.8235	.7347	.7059	.7143	.4706	.5294	.6471	.7059	.9235
24	.7333	.7333	.6154	.6154	.6000	.6154	.7333	.7692	.7333	.9402
25	.7059	.7059	.6471	.5882	.5714	.5882	.6471	.7647	.7059	.9235
26	.6667	.6667	.5385	.5385	.6667	.6923	.6667	.6923	.9000	.7692
27	.7368	.6316	.6471	.5882	.5625	.7059	.7895	.7647	.7895	.7059
28	.5789	.5789	.4706	.4118	.4375	.6471	.8421	.8235	.7368	.6471
29	.4737	.4737	.3529	.2941	.4375	.8824	.7368	.8235	.6316	.5294
30	.6667	.6667	.5385	.5385	.5333	.8446	.5333	.5385	.6667	.7692
31	.7647	.7647	.7059	.6471	.6429	.5294	.5882	.7059	.7647	.9824
32	.7647	.6471	.7059	.6471	.5714	.6471	.7059	.7059	.7647	.9824
33	.5263	.5263	.5294	.4706	.5000	.7059	.4737	.5294	.5789	.7059
34	.5882	.5882	.5294	.4706	.5714	.5882	.4118	.4118	.4706	.5992

	11	12	13	14	15	16	17	18	19	20
1	.7333	.7647	.7547	.7647	.7895	.8421	.8125	.8750	.8947	.9125
2	.7333	.6471	.5471	.7647	.7895	.7368	.9125	.8750	.7395	.9125
3	.6154	.7059	.7159	.7059	.7059	.7547	.7857	.7957	.8235	.7957
4	.6154	.6471	.6471	.6471	.7647	.8235	.7857	.7857	.7647	.7957
5	.6000	.5714	.5714	.6429	.7500	.7500	.6275	.7500	.7500	.6975
6	.7632	.6471	.6471	.5294	.4113	.4706	.4286	.4286	.5294	.4286
7	.8667	.7059	.7059	.5882	.5263	.5789	.5100	.5625	.6715	.5000
8	.9231	.7059	.7059	.7059	.5882	.5294	.5714	.5714	.5882	.5714
9	.7333	.8824	.6471	.6471	.6316	.6842	.7500	.6975	.7368	.7500
10	.9462	.8824	.7547	.7647	.7647	.8235	.8571	.8571	.9224	.9571
11	1.0000	.6923	.8462	.7692	.7333	.7333	.6667	.7333	.7333	.6667
12	.5923	1.0000	.7547	.7647	.7647	.8235	.9571	.8571	.9224	.9571
13	.8462	.7647	1.0000	.8824	.7647	.8235	.8571	.8571	.9224	.9571
14	.7692	.7647	.8424	1.0000	.8824	.8235	.9286	.9286	.8824	.9286
15	.7333	.7647	.7547	.8824	1.0000	.9474	.9375	1.0000	.9947	.9375
16	.7333	.8235	.9235	.8235	.9474	1.0000	.9375	1.0000	.9474	.9375
17	.6667	.8571	.8571	.9286	.9375	.9375	1.0000	.9375	.9375	1.0000
18	.7333	.8571	.8571	.9286	1.0000	1.0000	.9375	1.0000	1.0000	.9375
19	.7333	.8824	.8124	.8824	.8947	.9474	.9375	1.0000	1.0000	.9375
20	.6667	.8571	.8571	.9286	.9375	.9375	1.0000	.9375	.9375	1.0000
21	.6667	.8235	.8235	.9412	.8947	.8421	1.0000	.9375	.8947	1.0000
22	.6667	.8571	.8571	.9286	.9375	.9375	1.0000	.9375	.9375	1.0000
23	.6923	.8235	.9235	.9412	.9412	.8824	1.0000	1.0000	.9412	1.0000
24	.8667	.8462	.8462	.9231	.8667	.8667	.8100	.8667	.8667	.8100
25	.8462	.8235	.8235	.9412	.8235	.7647	.9571	.8571	.9235	.8571
26	.6667	.9231	.6154	.6923	.8000	.8000	.7333	.8000	.8000	.7333
27	.7333	.8235	.8235	.8235	.7368	.7895	.7500	.8125	.8421	.7500
28	.7333	.7647	.5471	.7647	.6842	.5316	.6250	.6975	.6842	.6250
29	.7333	.6471	.6471	.6471	.5789	.5263	.5100	.5625	.5789	.5000
30	.6667	.7692	.6154	.6923	.8000	.8000	.7333	.8000	.8000	.7333
31	.7632	.8824	.7547	.8824	.8424	.8235	.9286	.9286	.8424	.9286
32	.9462	.8824	.8124	.7647	.7647	.8235	.9571	.9571	.8424	.9571
33	.6000	.7059	.7159	.5882	.5263	.5789	.6275	.6250	.6715	.6975
34	.5385	.5882	.7059	.5882	.5382	.6471	.7143	.7143	.7059	.7143

	21	22	23	24	25	26	27	28	29	30
1	.7895	.8125	.8235	.7333	.7059	.6667	.7369	.5789	.4737	.6557
2	.7895	.8125	.8235	.7333	.7059	.6667	.6316	.5789	.4737	.6557
3	.7647	.7857	.7547	.6154	.6471	.5385	.6471	.4706	.3529	.5385
4	.7059	.7857	.7059	.6154	.5882	.5385	.5882	.4118	.2941	.5385
5	.6875	.6875	.7143	.6000	.5714	.6667	.5625	.4775	.4775	.5333
6	.4706	.4286	.4706	.6154	.5882	.6923	.7059	.6471	.8824	.3446
7	.5253	.5000	.5294	.7333	.6471	.6667	.7895	.8421	.7368	.5333
8	.6471	.5714	.6471	.7692	.7647	.5923	.7647	.8235	.8235	.5385
9	.7368	.7500	.7059	.7333	.7059	.8000	.7895	.7368	.6316	.6667
10	.8235	.8571	.8235	.8462	.8235	.7692	.7059	.6471	.5294	.7692
11	.6667	.6667	.5323	.8667	.8462	.6667	.7333	.7333	.7333	.6667
12	.8235	.8571	.8235	.8462	.8235	.9231	.8235	.7647	.6471	.7692
13	.8235	.8571	.8235	.8462	.8235	.6154	.8235	.6471	.6471	.6154
14	.9412	.9286	.9412	.9231	.9412	.5923	.8235	.7647	.6471	.6923
15	.8947	.9375	.9412	.8667	.8235	.8000	.7369	.6842	.5789	.3707
16	.8421	.9375	.8324	.8667	.7647	.8000	.7895	.6316	.5263	.8000
17	1.0000	1.0000	1.0000	.8000	.8571	.7333	.7500	.6250	.5000	.7333
18	.9375	.9375	1.0000	.8667	.8571	.8000	.8125	.6875	.5625	.3000
19	.8947	.9375	.9412	.8667	.8235	.8000	.9421	.6842	.5789	.9300
20	1.0000	1.0000	1.0000	.8000	.8571	.7333	.7500	.6250	.5000	.7333
21	1.0000	1.0000	1.0000	.8000	.8824	.7333	.7368	.6842	.5789	.7333
22	1.0000	1.0000	1.0000	.8000	.8571	.7333	.7500	.6250	.5000	.7333
23	1.0000	1.0000	1.0000	.8462	.8824	.7692	.7647	.7059	.5882	.7692
24	.8000	.8000	.8462	1.0000	1.0000	.8000	.8667	.8567	.7333	.9300
25	.8824	.8571	.8324	1.0000	1.0000	.7692	.7647	.8235	.7059	.7692
26	.7333	.7333	.7592	.8000	.7692	1.0000	.9100	.8000	.8000	.7333
27	.7368	.7500	.7547	.8667	.7647	.8000	1.0000	.8421	.7368	.6667
28	.6842	.6250	.7059	.8667	.8235	.8000	.8421	1.0000	.7895	.6667
29	.5789	.5000	.5382	.7333	.7059	.8000	.7369	.7895	1.0000	.5333
30	.7333	.7333	.7592	.8000	.7692	.7333	.6667	.6667	.5333	1.0000
31	.9412	.9286	.9412	.9231	.9412	.8462	.7059	.7647	.6471	.8462
32	.8235	.8571	.8235	.8462	.8235	.7692	.7059	.6471	.6471	.7692
33	.6316	.6675	.6471	.6000	.6471	.6667	.4737	.4211	.6316	.5333
34	.6471	.7143	.6471	.5385	.5294	.6154	.5294	.3529	.5882	.4515

	31	32	33	34
1	.7647	.7647	.5263	.5882
2	.7647	.6471	.5263	.5882
3	.7059	.7059	.5294	.5294
4	.6471	.6471	.4706	.4706
5	.6429	.5714	.5000	.5714
6	.5294	.6471	.7059	.5882
7	.5682	.7059	.4737	.4118
8	.7059	.7059	.5294	.4118
9	.7647	.7647	.5789	.4706
10	.8824	.8824	.7159	.5882
11	.7692	.8462	.5000	.5385
12	.8824	.8824	.7159	.5882
13	.7647	.8824	.7159	.7059
14	.8824	.7647	.5182	.5882
15	.8824	.7647	.5263	.5882
16	.8235	.8235	.5789	.6471
17	.9286	.8571	.5175	.7143
18	.9286	.8571	.6250	.7143
19	.8824	.8824	.5316	.7059
20	.9286	.8571	.5375	.7143
21	.9412	.8235	.6316	.6471
22	.9286	.8571	.6375	.7143
23	.9412	.8235	.6471	.6471
24	.9231	.8462	.6100	.5385
25	.9412	.8235	.6471	.5294
26	.9452	.7692	.6567	.6154
27	.7059	.7059	.4737	.5294
28	.7647	.6471	.4211	.3529
29	.6471	.6471	.6316	.5882
30	.8462	.7692	.5333	.4615
31	1.0000	.8824	.7059	.5882
32	.8824	1.0000	.8235	.7059
33	.7059	.8235	1.0000	.8824
34	.5882	.7059	.8824	1.0000

MATRIX OF SIMILARITY/DISSIMILARITY COEFFICIENTS

Computer output of matrix of between-OTU product-moment correlation coefficients for the albella-group of Timocratica, calculated from unstandardized data.

DATA NOT STANDARDIZED

	1	2	3	4	5	6	7	8	9	10
1	1.0000	.6042	.7989	.6583	.6547	.3055	.4198	.0655	.3269	.6583
2	.5042	1.0000	.3099	.2279	.6547	-.0655	.1217	.0655	.0163	.2279
3	.7888	.3099	1.0000	.8345	.7817	.0738	.1273	-.0738	.3039	.4709
4	.6583	.2279	.8345	1.0000	.7817	-.0994	-.1327	-.1823	.1707	.3462
5	.6547	.6547	.7817	.7817	1.0000	.0259	-.0727	-.1741	-.0778	.1515
6	.3055	-.0655	.8738	-.0994	.0259	1.0000	.6480	.7000	.6179	.4641
7	.4108	.1217	.1273	-.0327	-.0727	.6480	1.0000	.7998	.6445	.5270
8	.0655	.0655	-.0738	-.1823	-.1741	.7000	.7998	1.0000	.6326	.3912
9	.3259	.0163	.3339	.1707	-.0778	.6179	.6445	.6326	1.0000	.7511
10	.6583	.2279	.4708	.3462	.1515	.4641	.5230	.3812	.7511	1.0000
11	.4804	.4804	.1111	.1011	.1231	.6250	.7638	.8539	.4308	.6928
12	.4944	.1124	.3139	.1707	-.0259	.3678	.4497	.3825	.7424	.7511
13	.4944	.1124	.3139	.1707	-.0259	.3678	.4497	.3825	.2277	.4609
14	.2279	.2279	.1170	.0192	.0550	.1823	.2451	.3912	.1707	.3462
15	.3958	.3968	.1070	.3462	.3333	-.0994	.0882	.0994	.1083	.3462
16	.6374	.3269	.3785	.5550	.3333	.0154	.1910	-.0154	.2602	.5550
17	.3026	.3026	.2943	.2843	.0925	.0259	.1109	.1741	.3671	.5759
18	.6547	.6547	.2343	.2843	.3333	.0259	.2192	.1741	.2735	.5759
19	.7246	.3968	.4708	.3462	.3333	.1823	.3276	.0994	.3654	.6731
20	.3926	.3026	.2343	.2843	.0925	.0259	.1109	.1741	.3671	.5759
21	.2083	.2083	.1305	.1070	.0925	.0738	.1217	.2398	.3269	.4708
22	.3026	.3026	.2943	.2843	.0925	.0259	.1109	.1741	.3671	.5759
23	.3099	.3099	.1305	.1070	.1515	.0738	.1273	.2398	.3039	.4708
24	.4804	.4804	.1111	.1011	.1231	.3880	.4910	.5367	.4308	.6928
25	.1650	.1650	.0398	-.0537	-.0259	.2777	.3499	.5092	.3337	.5550
26	.4133	.4133	.0329	.0329	.3425	.4144	.3793	.3810	.6447	.5915
27	.5078	.2154	.2398	.0994	.0727	.4571	.5955	.5143	.5672	.3812
28	.1674	.1674	-.1273	-.2451	-.0727	.3099	.6899	.6480	.4893	.3105
29	.0753	.0769	-.2398	-.3812	.0778	.7571	.4719	.7998	.3508	.1923
30	.4133	.4133	.0329	.0329	.0403	-.2196	.7714	.0714	.3425	.5915
31	.2279	.2279	.1170	.0192	.0550	.1823	.2451	.3912	.4609	.6731
32	.4944	.1124	.3139	.1707	-.0259	.3678	.4497	.3825	.4944	.7511
33	.1217	.1217	.1273	-.0327	0.0000	.4085	-.1556	.0704	.1210	.5270
34	.0655	.0655	-.0738	-.1823	-.0259	.2142	-.1600	-.2143	-.1177	.1734

	11	12	13	14	15	15	17	18	19	20
1	.4834	.4944	.4344	.2279	.3959	.6374	.3126	.6547	.7246	.3076
2	.4804	.1124	.1124	.2279	.3959	.3269	.3126	.6547	.7069	.3176
3	.1011	.3039	.3339	.1970	.1079	.3785	.2847	.2847	.4708	.2847
4	.1011	.1707	.1707	.0192	.3462	.5550	.2843	.2843	.3462	.2843
5	.1231	-.0259	-.0259	.0550	.3333	.3333	.1925	.3737	.3337	.1325
6	.6250	.3678	.3378	.1827	-.0994	.0154	.1259	.0259	.1827	.1259
7	.7633	.4497	.4497	.2451	.0982	.1910	.1109	.2187	.3776	.1079
8	.8539	.3925	.3925	.3812	.0994	-.0154	.1741	.1741	.0934	.1741
9	.4308	.7424	.2273	.1707	.1083	.2697	.3671	.2335	.3654	.3671
10	.6928	.7511	.4509	.3462	.3452	.5550	.5758	.5758	.6731	.5759
11	1.0000	.3500	.5750	.5007	.4309	.4309	.2722	.4308	.4308	.2722
12	.3500	1.0000	.4349	.4609	.4609	.6079	.7006	.7006	.7511	.7006
13	.6750	.4848	1.0000	.7511	.4609	.6039	.7006	.7006	.7511	.7006
14	.5007	.4609	.7511	1.0000	.6731	.5550	.9257	.8257	.6731	.8257
15	.4308	.4609	.4509	.6731	1.0000	.8797	.9321	1.0000	.7296	.9321
16	.4308	.6039	.5039	.5550	.8797	1.0000	.9321	1.0000	.8797	.9321
17	.2722	.7006	.7106	.8257	.8321	.8321	1.0000	.8321	.8321	1.0000
18	.4308	.7006	.7006	.8257	1.0000	1.0000	.8321	1.0000	1.0000	.8321
19	.4308	.7511	.7511	.6731	.7286	.8797	.9321	1.0000	1.0000	.9321
20	.2722	.7006	.7106	.8257	.8321	.8321	1.0000	.8321	.8321	1.0000
21	.2722	.6268	.5268	.8345	.7246	.6374	1.0000	.8321	.7246	1.0000
22	.2722	.7006	.7106	.8257	.8321	.8321	1.0000	.8321	.8321	1.0000
23	.3175	.6268	.5268	.8345	.8345	.7171	1.0000	1.0000	.8345	1.0000
24	.7222	.6750	.5750	.8433	.7385	.7385	.6124	.7385	.7385	.6124
25	.6750	.6039	.5139	.8593	.5550	.4333	.7076	.7006	.5550	.7006
26	.3273	.8539	.2136	.3858	.6447	.6447	.5345	.6447	.6447	.5345
27	.4444	.6326	.5326	.6530	.4587	.5673	.5447	.6547	.7008	.5447
28	.4910	.5367	.2301	.5883	.3906	.2626	.4237	.5092	.3906	.4237
29	.5774	.3678	.3378	.4641	.2675	.1207	.3239	.3992	.2676	.3239
30	.3273	.5367	.2136	.3858	.6447	.6447	.5345	.6447	.6447	.5345
31	.5007	.7511	.4509	.6731	.6731	.5550	.9257	.8257	.6731	.8257
32	.6750	.7424	.7424	.4609	.4609	.5939	.7076	.7006	.7511	.7006
33	.2192	.4497	.4497	.2451	.0882	.1910	.4804	.2887	.3276	.4804
34	.0250	.1324	.3925	.0994	.0994	.2469	.3177	.3177	.3812	.3177

	21	22	23	24	25	25	27	28	29	30
1	.2093	.3026	.3193	.4804	.1650	.4193	.5078	.1674	.0769	.4177
2	.2093	.3026	.3099	.4904	.1650	.4193	.2154	.1674	.0769	.4177
3	.1935	.2443	.1305	.1011	.0398	.0329	.2399	-.1273	-.2398	.9329
4	.1079	.2843	.1370	.1011	-.0537	.0329	.0994	-.2451	-.3912	.9379
5	.0925	.0925	.1515	.1231	-.0253	.3425	.0727	-.0727	.9778	.7303
6	.0738	.0259	.0738	.3000	.2777	.4148	.4571	.3090	.7571	-.2196
7	.1217	.1009	.1273	.4910	.3499	.3393	.5055	.6889	.4710	.9714
8	.2398	.1741	.2393	.5367	.5092	.3810	.5143	.6480	.7000	.9714
9	.3259	.3671	.3039	.4398	.3337	.6447	.5673	.4893	.3500	.3475
10	.4708	.5758	.4708	.6928	.5550	.5916	.7812	.3105	.1823	.5916
11	.2722	.2722	.3175	.7222	.6750	.3273	.4444	.4910	.5774	.3273
12	.6268	.7006	.6268	.6750	.6039	.9539	.6326	.5767	.3678	.5767
13	.6258	.7006	.5258	.6750	.6039	.2196	.6326	.2901	.3678	.2196
14	.8345	.8257	.8345	.8433	.8593	.8858	.6639	.5883	.4641	.3858
15	.7246	.8321	.8345	.7385	.5550	.6447	.4587	.3906	.2676	.6447
16	.6374	.8321	.7171	.7385	.4333	.6447	.5673	.2626	.1207	.6447
17	1.0000	1.0000	1.0000	.6124	.7086	.5345	.5447	.4237	.3239	.5345
18	.8321	.8321	1.0000	.7385	.7006	.6447	.6547	.5092	.3892	.6447
19	.7246	.8321	.8345	.7385	.5550	.6447	.7008	.3906	.2676	.6447
20	1.0000	1.0000	1.0000	.6124	.7006	.5345	.5447	.4237	.3239	.5345
21	1.0000	1.0000	1.0000	.6124	.7171	.5345	.5078	.4564	.3693	.5345
22	1.0000	1.0000	1.0000	.6124	.7006	.5345	.5447	.4237	.3239	.5345
23	1.0000	1.0000	1.0000	.6928	.7171	.5916	.5533	.4910	.3873	.5916
24	.6124	.6124	.6328	1.0000	1.0000	.6001	.7222	.7638	.5774	.6001
25	.7171	.7006	.7171	1.0000	1.0000	.5367	.5092	.6947	.5401	.5367
26	.5345	.5345	.5316	.6001	.5357	1.0000	.6001	.6071	.6614	.4643
27	.5078	.5447	.5533	.7222	.5092	.6001	1.0000	.6054	.5114	.3273
28	.4564	.4237	.4910	.7638	.6847	.6071	.6054	1.0000	.5955	.3273
29	.3693	.3239	.3173	.5774	.5401	.6614	.5114	.5955	1.0000	.9045
30	.5345	.5345	.5316	.6001	.5367	.4643	.3273	.3393	.0945	1.0000
31	.8345	.8257	.8345	.8433	.8593	.7201	.3912	.5893	.4641	.7201
32	.6258	.7006	.6258	.6750	.6039	.5767	.3025	.2901	.3678	.5767
33	.4108	.4804	.4364	.2182	.3499	.3393	-.2449	-.1556	.2584	.9714
34	.2398	.3373	.2398	.0250	-.0154	.2196	.1796	-.3099	.2143	-.1796

	31	32	33	34
1	.2279	.4944	.1217	.0655
2	.2279	.1124	.1217	.0655
3	.1070	.3039	.1273	-.0738
4	.0192	.1707	-.0327	-.1823
5	.0550	-.0259	.0100	-.0259
6	.1823	.3678	.4185	.2147
7	.2451	.4497	-.0356	-.1690
8	.3912	.3825	.0704	-.2143
9	.4639	.4848	.1310	-.1177
10	.6731	.7511	.5230	.0994
11	.5007	.6750	.2182	.0250
12	.7511	.7424	.4497	.1324
13	.4609	.7424	.4497	.3825
14	.6731	.4609	.2451	.0934
15	.6731	.4609	.0382	.0994
16	.5550	.6039	.1310	.2469
17	.3257	.7006	.4304	.3373
18	.8257	.7006	.2387	.3373
19	.5731	.7511	.3276	.3812
20	.8257	.7006	.4304	.3373
21	.8345	.6268	.4108	.2398
22	.8257	.7006	.4304	.3373
23	.8345	.6268	.4364	.2398
24	.8433	.6750	.2182	.0250
25	.8593	.6039	.3199	-.0154
26	.7201	.5367	.3333	.2196
27	.3812	.3825	-.0449	.0286
28	.5883	.2901	-.1556	-.3099
29	.4641	.3678	.2334	.2143
30	.7201	.5367	.0714	-.0976
31	1.0000	.7511	.5230	.0994
32	.7511	1.0000	.5363	.3825
33	.5230	.6963	1.0000	.7688
34	.0994	.3825	.7388	1.0000

MATRIX OF SIMILARITY/DISSIMILARITY COEFFICIENTS

Computer output of matrix of between-OTU product-moment correlation coefficients for the albella-group of Timocratica, calculated from standardized data.

	1	2	3	4	5	6	7	8	9	10
1	1.0000	.5137	.6369	.5933	.5975	.0669	.3841	-.2241	-.0945	.1759
2	.5137	1.0000	.3362	.2697	.5875	-.1407	-.7927	-.0797	-.2319	-.1475
3	.6369	.3062	1.0000	.8336	.8632	-.1215	-.0715	-.2701	-.0267	.0781
4	.5933	.2697	.9336	1.0000	.9632	-.2281	-.1616	-.2716	-.0905	.0777
5	.5975	.5875	.9532	.8632	1.0000	.0446	-.1599	-.2574	-.2095	-.1977
6	.0669	-.1407	-.1215	-.2291	.0446	1.0000	.2740	.5799	.2040	.0777
7	.3841	-.0327	-.0715	-.1616	-.1909	.2740	1.0000	.5516	.2820	.1627
8	-.2241	-.0787	-.2301	-.2716	-.2574	.5798	.5516	1.0000	.5219	-.0713
9	-.0945	-.2319	-.0267	-.0905	-.2095	.2960	.3820	.5219	1.0000	.4967
10	.1759	-.1435	.0781	.0323	-.0937	.0993	.1657	-.0719	.4967	1.0000
11	.0264	.0264	-.1281	-.1291	-.1709	.2966	.4315	.7652	.0342	.4157
12	-.1475	-.3579	-.1973	-.2418	-.3579	-.0871	.0191	-.0125	.4897	.3307
13	-.0747	-.2882	-.1376	-.1945	-.2923	-.0133	.0766	.0687	-.4704	-.2155
14	-.4571	-.1507	-.3037	-.2972	-.2779	-.2525	-.1676	.0285	-.5176	-.4717
15	-.1373	.0028	-.1774	.3194	-.1472	-.4851	-.3499	-.2740	-.2040	-.2607
16	.1081	-.1138	-.0336	.4277	-.1472	-.4710	-.3244	-.5069	-.2697	-.0715
17	-.5405	-.5405	-.2214	-.2214	-.2946	-.6688	-.3701	-.6602	-.0384	-.2441
18	-.0778	-.0778	-.2214	-.2214	-.1472	-.5598	-.4193	-.6602	-.5346	-.2441
19	.1440	-.1942	-.3378	-.0748	-.1472	-.4920	-.2910	-.6797	-.3250	.0744
20	-.5405	-.5405	-.2214	-.2214	-.2946	-.5698	-.3701	-.6602	-.0384	-.2441
21	-.5154	-.2416	-.3110	-.2698	-.2946	-.5457	-.3507	-.3257	-.1234	-.4989
22	-.5435	-.5405	-.2214	-.2214	-.2946	-.6688	-.3701	-.6602	-.0384	-.2441
23	-.5404	-.1348	-.3110	-.2698	-.2549	-.5457	-.3996	-.3257	-.4507	-.4989
24	-.2564	-.2564	-.3506	-.3506	-.3715	-.2071	-.7259	.1033	-.1972	.1701
25	-.5478	-.2327	-.3306	-.3964	-.3953	-.1659	-.0641	.1916	-.2617	-.0783
26	-.1506	-.1506	-.2555	-.2555	.1056	.1963	-.1486	-.0436	.2260	.0736
27	-.0290	-.2304	-.1597	-.2275	-.2796	.1704	.2537	.2495	.3427	-.2987
28	-.2033	-.0990	-.2499	-.2996	-.2817	-.0308	.7445	.2658	.2089	-.1573
29	-.3044	-.1754	-.3382	-.4310	-.0966	.7857	.7061	.5166	.7025	-.3474
30	.1405	.1405	-.0154	-.0154	-.0979	-.4253	-.2746	-.2649	-.0344	.1741
31	-.5022	-.2253	-.3319	-.3677	-.3731	-.3764	-.2474	-.0747	-.1002	.1577
32	-.1475	-.3579	-.1973	-.2418	-.3579	-.0871	.0191	-.0125	-.0776	.3307
33	-.0773	.1693	-.1473	-.2372	-.0244	.3046	-.3364	-.2827	-.0879	.0577
34	-.1561	.1057	-.1333	-.1454	.0136	.2370	-.1730	-.2250	-.2805	-.2412

	11	12	13	14	15	16	17	18	19	20
1	.0254	-.1475	-.0747	-.4571	-.1373	.1091	-.5405	-.0779	.1049	-.5405
2	.0264	-.3579	-.2382	-.1507	.0029	-.1138	-.5475	-.0779	-.1042	-.5405
3	-.1291	-.1873	-.1376	-.3037	-.1774	-.0336	-.2214	-.2214	-.0379	-.2214
4	-.1291	-.2419	-.1345	-.2982	.3184	.4277	-.2714	-.2214	-.0749	-.2714
5	-.1709	-.3579	-.2329	-.2779	-.1472	-.1472	-.2546	-.1472	-.1472	-.2546
6	.3846	-.0871	-.0139	-.2525	-.4451	-.4717	-.6688	-.6688	-.4920	-.6688
7	.4315	.0191	.3766	-.1476	-.3499	-.3244	-.3701	-.4787	-.2919	-.3701
8	.7652	-.0125	.9587	.0286	-.2940	-.5068	-.6602	-.6602	-.6783	-.6602
9	.0342	.4802	-.4304	-.5176	-.3949	-.2687	-.3394	-.5746	-.3250	-.3394
10	.4162	.3300	-.2166	-.4717	-.2693	-.0185	-.2441	-.2441	.0764	-.2441
11	1.0000	-.2963	.4302	.0463	-.3902	-.3902	-.5721	-.3902	-.3902	-.5721
12	-.2953	1.0000	-.1357	-.2539	-.1471	.0236	.1260	.1260	.2759	.1260
13	.4802	-.1957	1.0000	.4533	-.0924	.0632	.2149	.2148	.3707	.2149
14	.3463	-.2538	.4533	1.0000	.2542	.0195	.4689	.4689	.1311	.4689
15	-.3902	-.1471	-.0324	.2542	1.0000	.8427	.4016	1.0000	.2441	.4016
16	-.3902	.0236	.0332	.0195	.8427	1.0000	.4016	1.0000	.5239	.4016
17	-.5321	.1260	.2148	.4689	.4016	.4016	1.0000	.4016	.4016	1.0000
18	-.3902	.1260	.2148	.4689	1.0000	1.0000	.4016	1.0000	1.0000	.4016
19	-.3902	.2759	.3307	.1311	.2441	.5239	.4016	1.0000	1.0000	.4016
20	-.5321	.1260	.2148	.4689	.4016	.4016	1.0000	.4016	.4016	1.0000
21	-.5321	-.0316	.0353	.5787	.3065	.0969	1.0000	.4016	.1395	1.0000
22	-.5321	.1260	.2148	.4689	.4016	.4016	1.0000	.4016	.4016	1.0000
23	-.5492	-.0316	.0353	.5787	.5195	.2465	1.0000	1.0000	.4591	1.0000
24	.3694	.1215	.2564	.6288	.1545	.1545	-.1139	.1545	.1545	-.1139
25	.3333	.0513	.1727	.7174	.0687	-.1885	.0540	.0949	-.1592	.0949
26	-.3358	.6026	-.5158	-.3390	.0151	.0151	-.1106	.0151	.0151	-.1106
27	-.0931	.2500	.2106	.3040	-.1234	-.0159	-.0396	.1116	.2078	-.0396
28	-.0255	.1120	-.1133	.2341	-.0797	-.2668	-.1769	-.1121	-.2223	-.1769
29	.1586	-.1037	-.0276	.0999	-.2253	-.4642	-.3017	-.4716	-.4585	-.3017
30	-.1339	-.0339	-.2059	-.0673	.1370	.1370	.1754	.1370	.1370	.1354
31	-.1155	.3250	-.2500	.2218	.2329	-.0335	.4764	.4064	.0453	.4064
32	.4024	.2871	.4379	-.2538	-.1471	.0236	.1260	.1260	.2759	.1260
33	-.1204	-.1350	-.0151	-.2865	-.2384	-.2279	.2224	-.1331	-.1471	.2224
34	-.1198	-.2227	.0425	-.2158	-.1444	-.0902	-.1785	-.1785	-.0669	-.1785

	21	22	23	24	25	25	27	28	29	30
1	-.5134	-.5405	-.5134	-.2564	-.5478	-.1506	-.1299	-.2733	-.3744	.1405
2	-.2416	-.5405	-.1348	-.2564	-.2327	-.1506	-.2394	-.0990	-.1754	.1405
3	-.3110	-.2214	-.3110	-.3506	-.3906	-.2655	-.1597	-.2499	-.3597	-.1154
4	-.2698	-.2214	-.2598	-.3506	-.3964	-.2655	-.2275	-.2996	-.4310	-.0154
5	-.2946	-.2946	-.2548	-.3715	-.3953	.1066	-.2786	-.2917	-.0966	-.0777
6	-.5457	-.6698	-.5457	-.2071	-.1669	.1363	.1704	-.0309	.7857	-.4753
7	-.3507	-.3701	-.3396	-.0250	-.0641	-.1486	.2537	.7445	.0961	-.2746
8	-.3257	-.6602	-.3257	.1039	.1916	-.0436	.3485	.7659	.5166	-.2649
9	-.1234	-.0334	-.4507	-.1972	-.2617	.3260	.3427	.2789	.0925	-.0744
10	-.4099	-.2441	-.4189	.1791	-.0289	.0736	-.2980	-.1573	-.3494	.1741
11	-.5321	-.5321	-.5482	.3694	.3333	-.3358	-.3591	-.0255	.1596	-.1397
12	-.0316	.1260	-.0316	.1215	.0513	.6026	.2590	.1127	-.1037	-.7379
13	.0553	.2148	.0553	.2664	.1727	-.5158	.2106	-.1833	-.0276	-.2709
14	.5787	.4689	.3787	.6288	.7174	-.3380	.3040	.2341	.0999	-.0633
15	.3065	.4016	.3195	.1545	.0697	.0151	-.1234	-.0797	-.2253	.1377
16	.0969	.4016	.2465	.1545	-.1805	.0151	-.1169	-.2668	-.4842	.1377
17	1.0000	1.0000	1.0100	-.1130	.0940	-.1106	-.0396	-.1069	-.3017	.1354
18	.4016	.4016	1.0100	.1545	.0940	.0151	.1116	-.1121	-.4016	.1377
19	.1395	.4016	.4581	.1545	-.1582	.0151	.2079	-.2223	-.4586	.1377
20	1.0000	1.0000	1.0100	-.1130	.0940	-.1106	-.0396	-.1069	-.3017	.1354
21	1.0000	1.0000	1.0100	-.1130	.2971	-.1106	-.1062	.0369	-.0737	.1354
22	1.0000	1.0000	1.0100	-.1130	.0940	-.1106	-.0396	-.1069	-.3017	.1354
23	1.0000	1.0000	1.0100	.0513	.2971	-.0444	-.0319	.0920	-.0734	.1665
24	-.1130	-.1130	.0513	1.0000	1.0000	-.0509	.3698	.2432	-.0471	-.0779
25	.2971	.0940	.2371	1.0000	1.0000	-.1029	.0312	.3147	.1639	-.0777
26	-.1106	-.1106	-.0444	-.0509	-.1029	1.0000	.1334	.0429	.3740	-.1479
27	-.1062	-.0396	-.0318	.3098	.0312	.1394	1.0000	.3514	.1793	-.1977
28	.0369	-.1069	.0320	.2432	.3147	.0429	.3514	1.0000	.1619	-.2169
29	-.0737	-.3017	-.0734	-.0471	.1639	.3340	.1793	.1619	1.0000	-.4506
30	.1354	.1354	.1565	-.0239	-.0372	-.1439	-.1832	-.2168	-.4506	1.0000
31	.5479	.4064	.5470	.5191	.6498	.2374	-.3755	.1846	.0235	.1764
32	-.0316	.1260	-.0316	.1215	.0513	-.0444	-.1260	-.2670	-.1037	-.7379
33	.1797	.2224	-.0747	-.3295	-.1842	-.0191	-.4957	-.4235	.1004	-.2433
34	-.1746	-.1385	-.1746	-.2916	-.3027	.0620	-.2227	-.2747	.2377	-.0787

	31	32	33	34
1	-.6022	-.1475	-.0773	-.1551
2	-.2253	-.3579	.1593	.1057
3	-.3919	-.1073	-.1473	-.1333
4	-.3673	-.2418	-.2372	-.1454
5	-.3731	-.3579	-.0344	.0136
6	-.3754	-.0071	.3346	.2370
7	-.2474	.0191	-.3364	-.1730
8	-.0747	-.0125	-.2329	-.2250
9	-.1092	-.0776	-.0339	-.2805
10	.1572	.3300	.0579	-.2412
11	-.1155	.4024	-.1304	-.1198
12	.3250	.2071	-.1350	-.2227
13	-.2600	.4579	-.3151	.0425
14	.2218	-.2538	-.2365	-.2158
15	.2323	-.1471	-.2384	-.1444
16	-.0335	.0236	-.2279	-.0992
17	.4064	.1260	.2224	-.1345
18	.4064	.1260	-.1331	-.1385
19	.0453	.2759	-.1471	-.0658
20	.4064	.1260	.2224	-.1385
21	.5473	-.0316	.1737	-.1746
22	.4064	.1260	.2224	-.1745
23	.5470	-.0316	-.0747	-.1746
24	.5191	.1215	-.3205	-.2916
25	.6493	.0513	-.1342	-.3027
26	.2374	-.0848	-.0191	.0620
27	-.3355	-.3260	-.4357	-.2227
28	.1846	-.2670	-.4235	-.2742
29	.0235	-.1037	.1304	.2372
30	.1754	-.0333	-.2437	-.0787
31	1.0000	.3250	.0395	-.2699
32	.3250	1.0000	.2318	.0259
33	.0395	.2818	1.0000	.6322
34	-.2699	.0269	.6322	1.0000

MATRIX OF SIMILARITY/DISSIMILARITY COEFFICIENTS

Computer output of matrix of between-OTU taxonomic distance coefficients for the albella-group of Timocratica, calculated from unstandardized data.

	1	2	3	4	5	6	7	8	9	10
1	0.0000	.3244	.2425	.3430	.3536	.6460	.6170	.6417	.5170	.3470
2	.3244	0.0000	.4271	.4851	.3536	.7670	.6882	.6417	.6070	.4951
3	.2425	.4201	0.0100	.2425	.2673	.7276	.6869	.6460	.5623	.4201
4	.3430	.4851	.2425	0.0000	.2673	.7570	.7276	.7276	.5941	.4951
5	.3536	.3536	.2573	.2573	0.0000	.7559	.7500	.7559	.6614	.5465
6	.6460	.7670	.7276	.7670	.7559	0.0000	.4201	.4201	.4851	.5941
7	.6070	.6882	.5350	.7276	.7500	.4201	0.0100	.3430	.4544	.5423
8	.6417	.6417	.6160	.7276	.7559	.4201	.3430	0.0000	.4201	.5423
9	.5130	.6070	.5423	.5941	.6614	.4851	.4544	.4201	0.0000	.3470
10	.3430	.4851	.4201	.4851	.5345	.5341	.5423	.5423	.3430	.7070
11	.5164	.5164	.6202	.6202	.5325	.4804	.3451	.2774	.5164	.3922
12	.4851	.5941	.5423	.5941	.6547	.5941	.5423	.5423	.3430	.3430
13	.4851	.5941	.5423	.5941	.6547	.5941	.5423	.5423	.5941	.4851
14	.4851	.4851	.5423	.5941	.5976	.6869	.6417	.5423	.5941	.4851
15	.4544	.4508	.5423	.4851	.5000	.7670	.6882	.6417	.6070	.4951
16	.3974	.5130	.4351	.4271	.5000	.7276	.6489	.6369	.5620	.4201
17	.4330	.4330	.4529	.4629	.5530	.7559	.7171	.6547	.5000	.3780
18	.3536	.3536	.4529	.4629	.5000	.7559	.6614	.6547	.5590	.7276
19	.3244	.4588	.4201	.4851	.5000	.5869	.6170	.6417	.5130	.3470
20	.4330	.4330	.4529	.4629	.5530	.7559	.7171	.6547	.5000	.3780
21	.4588	.4588	.4351	.5423	.5590	.7276	.6882	.5941	.5170	.4201
22	.4330	.4330	.4529	.4629	.5590	.7559	.7171	.6547	.5000	.3780
23	.4201	.4201	.4351	.5423	.5345	.7276	.6869	.5941	.5423	.4201
24	.5164	.5164	.6202	.6202	.6325	.5202	.5164	.4904	.5164	.3922
25	.5423	.5423	.5341	.6417	.6547	.6417	.5941	.4851	.5423	.4201
26	.5774	.5774	.5794	.6794	.5774	.5547	.5774	.5547	.4472	.4944
27	.5130	.6070	.5341	.6417	.6614	.5423	.4588	.4451	.4544	.5423
28	.6489	.6489	.7276	.7670	.7500	.5941	.3974	.4201	.5170	.5341
29	.7255	.7255	.5344	.8402	.7500	.3430	.5130	.4201	.6070	.6460
30	.5774	.5774	.6794	.6794	.6831	.7345	.6831	.6794	.5774	.4944
31	.4851	.4851	.5423	.5941	.5976	.6460	.6417	.5423	.4851	.3470
32	.4851	.5941	.5423	.5941	.6547	.5941	.5423	.5423	.4851	.3470
33	.5882	.6882	.5350	.7276	.7071	.5423	.7155	.6460	.5489	.3423
34	.6417	.6417	.6160	.7276	.6547	.6417	.7670	.7670	.7276	.5417

	11	12	13	14	15	16	17	18	19	20
1	.5154	.4851	.4351	.4851	.4588	.3974	.4330	.3536	.3244	.4330
2	.5164	.5941	.5341	.4851	.4588	.5130	.4330	.3536	.4588	.4330
3	.6202	.5423	.5123	.5423	.5423	.4851	.4629	.4629	.4201	.4629
4	.6202	.5941	.5341	.5941	.4851	.4201	.4629	.4629	.4851	.4629
5	.6325	.6547	.6347	.5976	.5000	.5000	.5530	.5000	.5100	.5530
6	.4804	.5941	.5341	.6950	.7670	.7276	.7559	.7559	.6860	.7559
7	.3651	.5423	.5123	.6417	.6882	.5489	.7071	.6514	.6570	.7071
8	.2774	.5423	.5123	.5423	.6417	.6860	.6547	.6547	.6417	.6547
9	.5164	.3430	.5341	.5941	.6070	.5620	.5100	.5590	.5130	.5900
10	.3922	.3430	.4351	.4851	.4851	.4201	.3790	.3790	.3430	.3790
11	0.0000	.5547	.3322	.4804	.5164	.5164	.5774	.5164	.5164	.5774
12	.5547	0.0000	.4351	.4851	.4851	.4201	.3790	.3780	.3430	.3780
13	.3922	.4851	0.0100	.3430	.4851	.4201	.3790	.3780	.3430	.3780
14	.4804	.4851	.3430	0.0000	.3430	.4201	.2673	.2673	.3430	.2673
15	.5154	.4851	.4351	.3430	0.0000	.2294	.2500	0.0000	.3244	.2500
16	.5154	.4201	.4201	.4201	.2294	0.0000	.2500	0.0000	.2294	.2500
17	.5774	.3780	.3780	.2673	.2500	.2500	0.0000	.2500	.2500	0.0000
18	.5154	.3780	.3780	.2673	0.0000	0.0000	.2500	0.0000	0.0000	.2500
19	.5154	.3430	.3430	.3430	.3244	.2294	.2500	0.0000	0.0000	.2500
20	.5774	.3780	.3780	.2673	.2500	.2500	0.0000	.2500	.2500	0.0000
21	.5774	.4201	.4201	.2425	.3244	.3974	0.0000	.2500	.3244	0.0000
22	.5774	.3780	.3780	.2673	.2500	.2500	0.0000	.2500	.2500	0.0000
23	.5547	.4201	.4201	.2425	.2425	.3430	0.0000	0.0000	.2425	0.0000
24	.3651	.3922	.3322	.2774	.3651	.3651	.4472	.3651	.3651	.4472
25	.3922	.4201	.4201	.2425	.4201	.4351	.3790	.3780	.4201	.3780
26	.5774	.2774	.5202	.5547	.4472	.4472	.5164	.4472	.4472	.5164
27	.5154	.4201	.4201	.4201	.5130	.4588	.5100	.4330	.3974	.5130
28	.5154	.4851	.5341	.4851	.5620	.6070	.6124	.5590	.5620	.6124
29	.5154	.5941	.5341	.5941	.6489	.6882	.7071	.6514	.6489	.7071
30	.5774	.4804	.5202	.5547	.4472	.4472	.5164	.4472	.4472	.5164
31	.4804	.3430	.4351	.3430	.3430	.4201	.2673	.2673	.3430	.2673
32	.3922	.3430	.3430	.4351	.4851	.4201	.3790	.3780	.3430	.3780
33	.6325	.5423	.5123	.6417	.6882	.6489	.5590	.6124	.5070	.5590
34	.6734	.6417	.5123	.6417	.6417	.5341	.5345	.5345	.5423	.5345

	21	22	23	24	25	25	27	28	29	31
1	.4538	.4330	.4201	.5164	.5423	.5774	.5130	.6489	.7255	.5774
2	.4538	.4330	.4201	.5164	.5423	.5774	.6070	.6489	.7255	.5774
3	.4831	.4629	.4351	.6202	.5941	.6794	.5941	.7276	.9144	.5774
4	.5423	.4629	.5423	.6202	.6417	.6794	.6417	.7670	.8402	.5794
5	.5530	.5590	.5345	.6325	.6547	.5774	.6614	.7500	.7500	.6331
6	.7276	.7559	.7276	.6202	.6417	.5547	.5423	.5941	.3430	.7415
7	.6882	.7071	.6369	.5164	.5941	.5774	.4599	.3974	.5130	.6831
8	.5941	.6547	.5341	.4804	.4851	.5547	.4851	.4201	.4201	.6704
9	.5130	.5000	.5423	.5164	.5423	.4472	.4599	.5130	.6070	.5774
10	.4201	.3780	.4201	.3922	.4201	.4804	.5423	.5941	.6860	.4904
11	.5774	.5774	.5547	.3651	.3922	.5774	.5164	.5164	.5164	.5774
12	.4201	.3780	.4201	.3922	.4201	.2774	.4201	.4851	.5941	.4404
13	.4201	.3780	.4201	.3922	.4201	.6202	.4201	.5941	.5041	.6202
14	.2425	.2673	.2425	.2774	.2425	.5547	.4201	.4851	.5941	.5547
15	.3244	.2500	.2425	.3651	.4201	.4472	.5130	.5620	.6489	.4472
16	.3974	.2500	.3430	.3651	.4851	.4472	.4599	.6070	.6882	.4472
17	0.0000	0.0000	0.0100	.4472	.3780	.5164	.5000	.6124	.7071	.5164
18	.2500	.2500	0.0100	.3651	.3780	.4472	.4330	.5590	.6614	.4472
19	.3244	.2500	.2425	.3651	.4201	.4472	.3974	.5620	.6489	.4472
20	0.0000	0.0000	0.0000	.4472	.3780	.5164	.5000	.6124	.7071	.5164
21	0.0000	0.0000	0.0100	.4472	.3430	.5164	.5130	.5620	.6489	.5164
22	0.0000	0.0000	0.0100	.4472	.3780	.5164	.5000	.6124	.7071	.5164
23	0.0000	0.0000	0.0100	.3922	.3430	.4804	.4851	.5423	.6417	.4904
24	.4472	.4472	.3322	0.0000	0.0000	.4472	.7651	.3651	.5164	.4472
25	.3430	.3780	.3430	0.0000	0.0000	.4804	.4851	.4201	.5423	.4904
26	.5164	.5164	.4904	.4472	.4904	0.0000	.4472	.4472	.4472	.5104
27	.5130	.5000	.4951	.3651	.4851	.4472	0.7000	.3974	.5130	.5774
28	.5620	.6124	.5423	.3651	.4201	.4472	.3974	0.0100	.4599	.5774
29	.6489	.7071	.5417	.5164	.5423	.4472	.5130	.4588	0.7000	.6331
30	.5164	.5164	.4904	.4472	.4804	.5164	.5774	.5774	.6831	0.7000
31	.2425	.2673	.2425	.2774	.2425	.3922	.5423	.4851	.5941	.3922
32	.4201	.3780	.4201	.3922	.4201	.4804	.5423	.5941	.5941	.4904
33	.6070	.5590	.5341	.6325	.5941	.5774	.7255	.7609	.6070	.6331
34	.5941	.5345	.5341	.6794	.5860	.5202	.6860	.9044	.6417	.7339

	31	32	33	34
1	.4851	.4851	.6182	.6417
2	.4851	.5941	.5182	.6417
3	.5423	.5423	.5150	.6160
4	.5941	.5941	.7276	.7276
5	.5976	.6547	.7171	.6547
6	.5830	.5941	.5123	.6417
7	.6417	.5423	.7255	.7670
8	.5423	.5423	.5160	.7670
9	.4851	.4851	.6189	.7276
10	.3430	.3430	.5123	.6417
11	.4804	.3922	.6125	.6794
12	.3430	.3430	.5123	.6417
13	.4851	.3430	.5123	.5423
14	.3430	.4851	.5117	.6417
15	.3430	.4851	.6182	.6417
16	.4201	.4201	.6189	.5941
17	.2673	.3780	.5330	.5345
18	.2673	.3780	.6124	.5345
19	.3430	.3430	.6170	.5423
20	.2673	.3780	.5330	.5345
21	.2425	.4201	.6173	.5941
22	.2673	.3780	.5390	.5345
23	.2425	.4201	.5341	.5941
24	.2774	.3922	.6125	.6794
25	.2425	.4201	.5341	.6860
26	.3922	.4804	.5174	.6202
27	.5423	.5423	.7255	.6860
28	.4851	.5941	.7309	.8044
29	.5941	.5941	.6170	.6417
30	.3922	.4804	.5131	.7338
31	0.0000	.3430	.5123	.6417
32	.3430	0.0000	.4201	.5423
33	.5423	.4201	0.0000	.3430
34	.6417	.5423	.3430	0.0000

MATRIX OF SIMILARITY/DISSIMILARITY COEFFICIENTS

Computer output of matrix of between-OTU taxonomic distance coefficients for the albella-group of timocratica, calculated from standardized data.

DATA STANDARDIZED BY ROWS (ZFPO MEAN, UNIT S.D.)

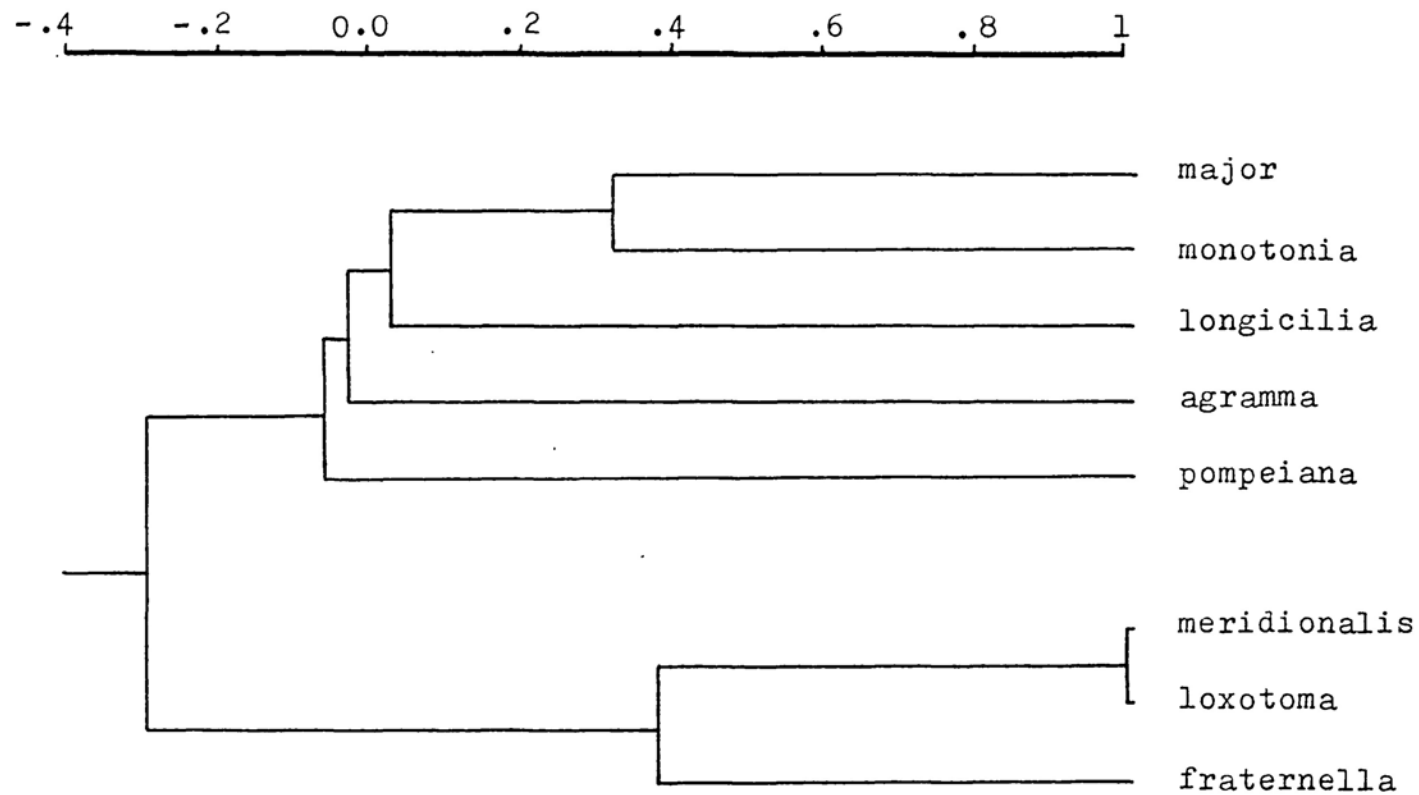
	1	2	3	4	5	6	7	8	9	10
1	0.0030	.8301	.9424	1.1155	1.0823	1.5711	1.6055	1.4440	1.1852	.9272
2	.8301	0.0000	1.2164	1.4193	1.0823	1.8875	1.8174	1.5442	1.4470	1.7059
3	.8424	1.2164	0.0100	.7313	.6907	1.8714	1.8949	1.6717	1.4161	1.1807
4	1.1155	1.4193	.7313	0.0000	.6907	2.0732	2.0311	1.8247	1.5937	1.7999
5	1.0823	1.0823	.6907	.6907	0.0000	1.9431	2.7173	1.8934	1.6851	1.6739
6	1.6711	1.8875	1.8714	2.0092	1.9431	0.0000	1.4150	1.0954	1.2235	1.4520
7	1.6055	1.8074	1.9349	2.0311	2.0573	1.4050	0.0000	1.1254	1.2900	1.4471
8	1.4440	1.5442	1.5717	1.8247	1.8934	1.0854	1.1254	0.0000	.9885	1.1935
9	1.1852	1.4470	1.4161	1.5937	1.6851	1.2235	1.2900	.8885	0.0000	.7919
10	.9272	1.2060	1.1307	1.3888	1.4730	1.4520	1.4821	1.1935	.7919	0.7007
11	1.1848	1.1848	1.5361	1.5961	1.6289	1.2714	1.2252	.6193	1.1277	.3513
12	1.1129	1.4172	1.3358	1.5757	1.6860	1.4408	1.4711	1.1697	.7607	.7444
13	1.1271	1.4284	1.4871	1.5858	1.6974	1.4297	1.4603	1.1561	1.2866	1.0212
14	1.1010	1.2295	1.3363	1.5674	1.5890	1.6040	1.6313	1.1809	1.2639	.3931
15	1.1531	1.2640	1.4318	1.2898	1.3900	1.8353	1.7597	1.4799	1.3856	1.1225
16	1.0579	1.3447	1.4302	1.1940	1.3900	1.7700	1.6977	1.5574	1.3074	1.0123
17	1.0259	1.0259	1.3158	1.3158	1.4913	1.7763	1.7738	1.4178	1.0817	.7714
18	.8722	.8722	1.3158	1.3158	1.3900	1.7763	1.6996	1.4179	1.2090	.7714
19	.8034	1.1531	1.1340	1.4002	1.3900	1.6119	1.5504	1.3759	1.1295	.7714
20	1.0259	1.0259	1.3158	1.3158	1.4913	1.7763	1.7738	1.4179	1.0817	.7714
21	1.0473	1.1682	1.2989	1.4818	1.4913	1.6833	1.6912	1.2866	1.0935	.9517
22	1.0259	1.0259	1.3158	1.3158	1.4913	1.7763	1.7738	1.4178	1.0817	.7714
23	.9754	1.1184	1.2988	1.4818	1.4860	1.6833	1.7094	1.2866	1.1561	.9517
24	1.1631	1.1691	1.5328	1.5828	1.6175	1.5301	1.4592	1.0528	1.1112	.9760
25	1.2006	1.3194	1.4566	1.6388	1.6743	1.5309	1.5595	1.0795	1.1607	.9701
26	1.3537	1.3597	1.7497	1.7497	1.4859	1.3361	1.5530	1.2569	1.0257	1.1129
27	1.1926	1.4526	1.5159	1.6830	1.6908	1.7139	1.2742	1.0793	.9579	1.1671
28	1.6611	1.7399	1.9477	2.0804	2.0439	1.5624	.8405	1.2591	1.3545	1.5401
29	1.7154	1.7918	1.9396	2.1291	1.8923	.7044	1.4867	1.0971	1.4244	1.6139
30	2.3674	2.3674	2.7133	2.7133	2.6150	2.4130	2.6779	2.5946	2.3797	2.3505
31	1.0865	1.2165	1.3748	1.5572	1.5769	1.6138	1.6410	1.1943	1.0523	.7044
32	1.1129	1.4172	1.3358	1.5757	1.6860	1.4408	1.4711	1.1697	1.0795	.7444
33	1.3445	1.8743	1.3503	1.9971	2.0636	1.2914	2.1469	1.5970	1.8529	1.4254
34	2.1183	2.0463	2.2796	2.3940	2.2769	1.3740	2.4230	2.2529	2.2773	2.7642

	11	12	13	14	15	16	17	18	19	20
1	1.1848	1.1129	1.1271	1.1010	1.1531	1.0579	1.1259	.9722	.9704	1.1259
2	1.1848	1.4172	1.4284	1.2295	1.2640	1.3447	1.0259	.9722	1.1531	1.1259
3	1.5951	1.3959	1.4171	1.3863	1.4819	1.4002	1.3159	1.3159	1.1940	1.3159
4	1.5951	1.5757	1.5358	1.5674	1.2899	1.1940	1.3159	1.3159	1.4092	1.3159
5	1.6289	1.6860	1.6374	1.5890	1.3900	1.3900	1.4913	1.3900	1.3900	1.4913
6	1.2714	1.4408	1.4297	1.6040	1.8353	1.7700	1.7763	1.7763	1.6119	1.7763
7	1.2252	1.4711	1.4503	1.6313	1.7597	1.6977	1.7738	1.6996	1.6594	1.7738
8	.6133	1.1697	1.1561	1.1909	1.4739	1.5574	1.4179	1.4179	1.7750	1.4179
9	1.1277	.7607	1.2366	1.2639	1.3956	1.3074	1.1917	1.2090	1.1795	1.1917
10	.8513	.7444	1.0219	.9931	1.1225	1.1123	.7714	.7714	.7000	.7714
11	0.0000	1.2039	.9105	1.0121	1.0879	1.0879	1.2225	1.0879	1.1879	1.2225
12	1.2039	0.0000	1.0376	1.0093	1.1369	1.0282	.7965	.7965	.7229	.7965
13	.8005	1.0376	0.8700	.7271	1.1508	1.0435	.8293	.8293	.7444	.8293
14	1.0121	1.0093	.7271	0.0000	.8920	1.0153	.5629	.5629	.7044	.5629
15	1.0879	1.1369	1.1508	.8920	0.0000	.4589	.5401	0.0000	.8701	.5401
16	1.0879	1.0282	1.0435	1.0153	.4588	0.0000	.5401	0.0000	.6917	.5401
17	1.2225	.7965	.8203	.5628	.5401	.5401	0.0000	.5401	.5401	0.0000
18	1.0879	.7965	.8203	.5628	0.0000	0.0000	.5401	0.0000	0.0000	.5401
19	1.0879	.7228	.7444	.7044	.8301	.6917	.5401	0.0000	0.0000	.5401
20	1.2225	.7965	.8203	.5628	.5401	.5401	0.0000	.5401	.5401	0.0000
21	1.2225	.8705	.8385	.5108	.8509	.9569	0.0000	.5401	.6754	0.0000
22	1.2225	.7965	.8203	.5628	.5401	.5401	0.0000	.5401	.5401	0.0000
23	1.1686	.8705	.8385	.5108	.7313	.9775	0.0000	0.0000	.4851	0.0000
24	.7925	.8513	.8266	.5474	.7452	.7452	.9399	.7452	.7452	.9399
25	.8513	.8385	.8705	.4787	1.0123	1.1225	.7714	.7714	.8517	.7714
26	1.3044	.7168	1.3363	1.2402	1.0185	1.0185	1.1613	1.0185	1.0185	1.1613
27	1.1047	.8988	.9511	.9201	1.2121	1.1219	1.1737	.9626	.9833	1.1737
28	1.4592	1.3584	1.5493	1.3681	1.5448	1.6115	1.5997	1.5052	1.4555	1.5997
29	1.3026	1.4319	1.4207	1.4410	1.6031	1.6674	1.6659	1.5759	1.5172	1.6659
30	2.3360	2.3695	2.5019	2.4231	2.1893	2.1893	2.2597	2.1893	2.1893	2.2597
31	1.0324	.7271	1.0193	.7000	.8740	.9996	.5275	.5275	.6915	.5275
32	.9260	.7659	.7000	1.0033	1.1363	1.0292	.7965	.7965	.7229	.7965
33	1.4360	1.4368	1.4327	1.5800	1.9569	1.9023	1.6939	1.7789	1.7721	1.6939
34	2.1979	2.0721	1.9335	2.0657	2.1310	2.0750	1.9823	1.9923	1.9419	1.9823

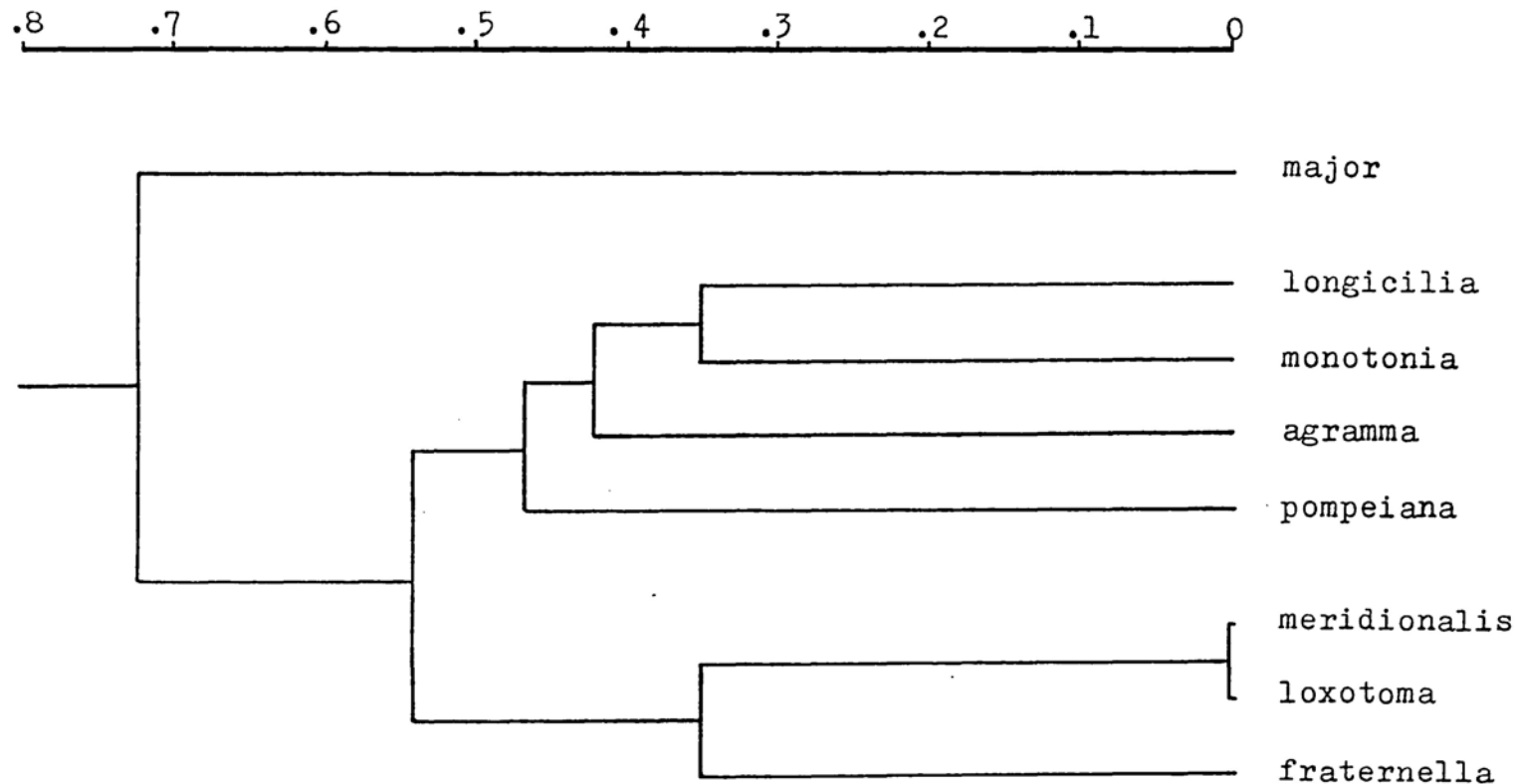
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2	1.1632	1.0259	1.1184	1.1691	1.3194	1.3597	1.4526	1.7392	1.7019	2.3674
3	1.2939	1.3158	1.2384	1.5828	1.4665	1.7497	1.5158	1.9477	1.9996	2.7133
4	1.4818	1.3158	1.4318	1.5828	1.6388	1.7497	1.6930	2.0804	2.1291	2.7133
5	1.4913	1.4913	1.4960	1.6175	1.6743	1.4859	1.6998	2.0449	1.8923	2.6190
6	1.5833	1.7763	1.6333	1.5301	1.5309	1.7361	1.7119	1.6624	.7044	2.3137
7	1.6912	1.7738	1.7094	1.4592	1.5595	1.5930	1.2742	.8405	1.4967	2.6379
8	1.2866	1.4178	1.2966	1.0528	1.0795	1.2568	1.7093	1.2591	1.0971	2.5846
9	1.0935	1.4817	1.1561	1.1112	1.1697	1.0257	.9579	1.3585	1.4244	2.3373
10	.9517	.7714	.9517	.8260	.8701	1.1129	1.1671	1.5490	1.6139	2.3605
11	1.2225	1.2225	1.1585	.7925	.9513	1.3044	1.1047	1.4592	1.3026	2.3309
12	.8785	.7965	.9705	.8513	.8885	.7168	.9598	1.3584	1.4319	2.3625
13	.8885	.8203	.8385	.8266	.8705	1.3863	.9511	1.5493	1.4297	2.5919
14	.5193	.5628	.5103	.5474	.4737	1.2402	.3201	1.3631	1.4410	2.4231
15	.8509	.5401	.7313	.7452	1.0123	1.0185	1.2121	1.5448	1.6031	2.1973
16	.9659	.5401	.8775	.7452	1.1225	1.0185	1.1219	1.6115	1.6674	2.1973
17	0.0000	0.0000	0.0000	.9309	.7714	1.1613	1.1037	1.5992	1.6659	2.2592
18	.5401	.5401	0.0000	.7452	.7714	1.0185	.9626	1.5052	1.5759	2.1973
19	.6754	.5401	.4351	.7452	.9517	1.0185	.9833	1.4555	1.5172	2.1973
20	0.0000	0.0000	0.0000	.9309	.7714	1.1613	1.1037	1.5992	1.6659	2.2592
21	0.0000	0.0000	0.0000	.9309	.7000	1.1613	1.1119	1.4675	1.5287	2.2592
22	0.0000	0.0000	0.0000	.9309	.7714	1.1613	1.1037	1.5992	1.6659	2.2592
23	0.0000	0.0000	0.0000	.4005	.7000	1.0941	1.0523	1.4693	1.5289	2.3517
24	.9309	.9309	.9005	0.0000	0.0000	1.0360	.7695	1.2252	1.3166	2.1975
25	.7000	.7714	.7000	0.0000	0.0000	1.1129	1.3371	1.2916	1.3592	2.3605
26	1.1613	1.1613	1.1341	1.0360	1.1129	0.0000	1.0003	1.3819	1.1187	2.3946
27	1.1119	1.1037	1.8523	.7695	1.0371	1.0003	0.0000	1.1568	1.2335	2.3283
28	1.4675	1.5992	1.4593	1.2252	1.2916	1.3819	1.1568	0.0000	1.4243	2.5160
29	1.5287	1.6659	1.5289	1.3166	1.3592	1.1187	1.2335	1.4243	0.0000	2.5617
30	2.2592	2.2592	2.3517	2.1975	2.3605	2.3046	2.3283	2.5160	2.5617	0.0000
31	.4737	.5275	.4787	.5841	.5103	.9473	1.1561	1.3736	1.4520	2.2971
32	.8785	.7965	.9705	.8513	.8885	1.1318	1.1809	1.5595	1.4319	2.3625
33	1.7622	1.6939	1.4351	1.8460	1.5057	1.7310	1.9801	2.2020	1.6793	2.7657
34	2.0016	1.9823	2.0016	2.2074	2.1204	2.0980	2.1543	2.4776	1.3676	3.1245

	31	32	33	34
1	1.0665	1.1129	1.9445	2.1143
2	1.2165	1.4172	1.5743	2.0463
3	1.3748	1.3958	1.8509	2.2796
4	1.5572	1.5757	1.9301	2.3940
5	1.5769	1.6860	2.0536	2.2768
6	1.6138	1.4408	1.2314	1.9740
7	1.6410	1.4711	2.1459	2.4230
8	1.1943	1.1697	1.5170	2.2528
9	1.0523	1.0795	1.8528	2.2673
10	.7044	.7444	1.4254	2.0542
11	1.0324	.8260	1.8360	2.1978
12	.7271	.7659	1.4368	2.0721
13	1.0093	.7000	1.4027	1.9335
14	.7000	1.0093	1.5300	2.0657
15	.8740	1.1369	1.9569	2.1310
16	.7936	1.0282	1.9123	2.0750
17	.5275	.7965	1.5339	1.9823
18	.5275	.7965	1.7780	1.9823
19	.5815	.7228	1.7721	1.9419
20	.5275	.7965	1.5339	1.9823
21	.4787	.8705	1.7522	2.0016
22	.5275	.7965	1.6339	1.9823
23	.4747	.8705	1.4351	2.0016
24	.5841	.8513	1.9460	2.2074
25	.5108	.8885	1.5157	2.1204
26	.9473	1.1318	1.7319	2.0940
27	1.1561	1.1909	1.9301	2.1548
28	1.3796	1.5595	2.2120	2.4776
29	1.4520	1.4319	1.5793	1.9676
30	2.2871	2.3695	2.7550	3.1245
31	0.0000	.7271	1.4164	2.0540
32	.7271	0.0000	1.2156	1.9253
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34	2.0540	1.9253	1.4930	0.0000

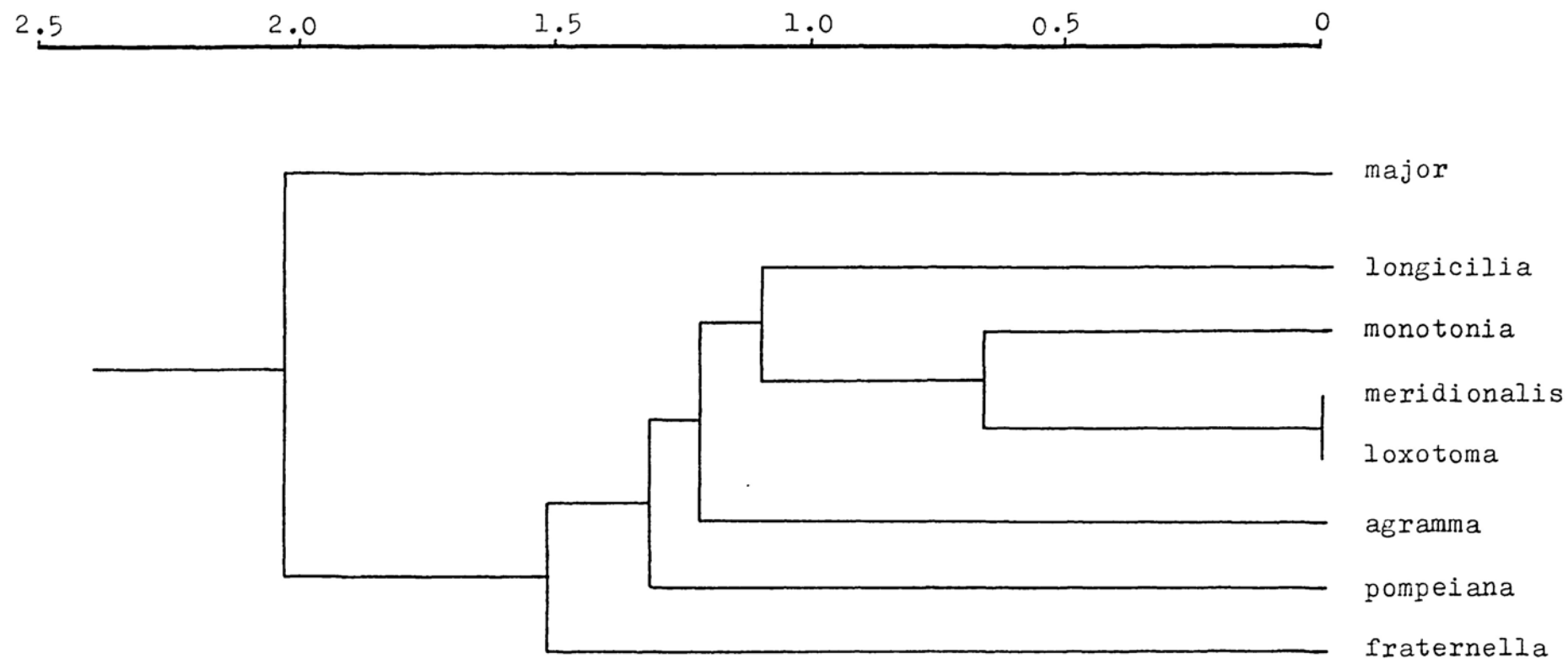
MATRIX OF SIMILARITY/DISSIMILARITY COEFFICIENTS



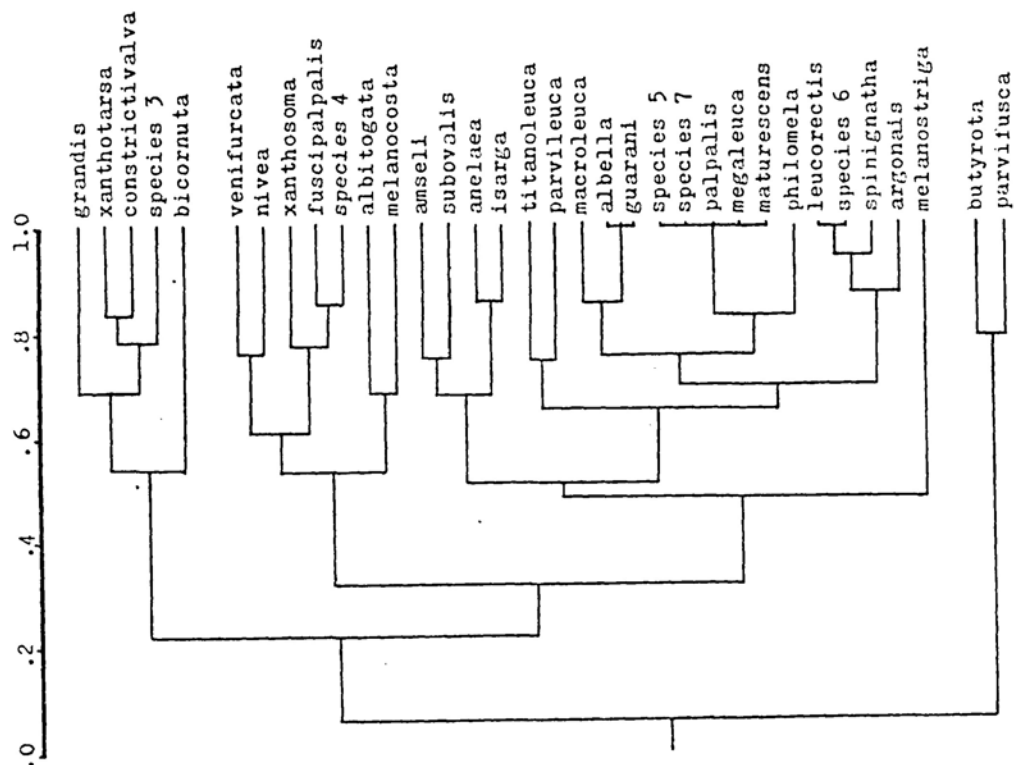
Phenogram of the species of the monotonia group of Timocratica calculated by weighted pair-group method of average linkage from matrix of between OTU correlation coefficients, using standardized data. Numbers at top denote magnitude of correlation coefficient.



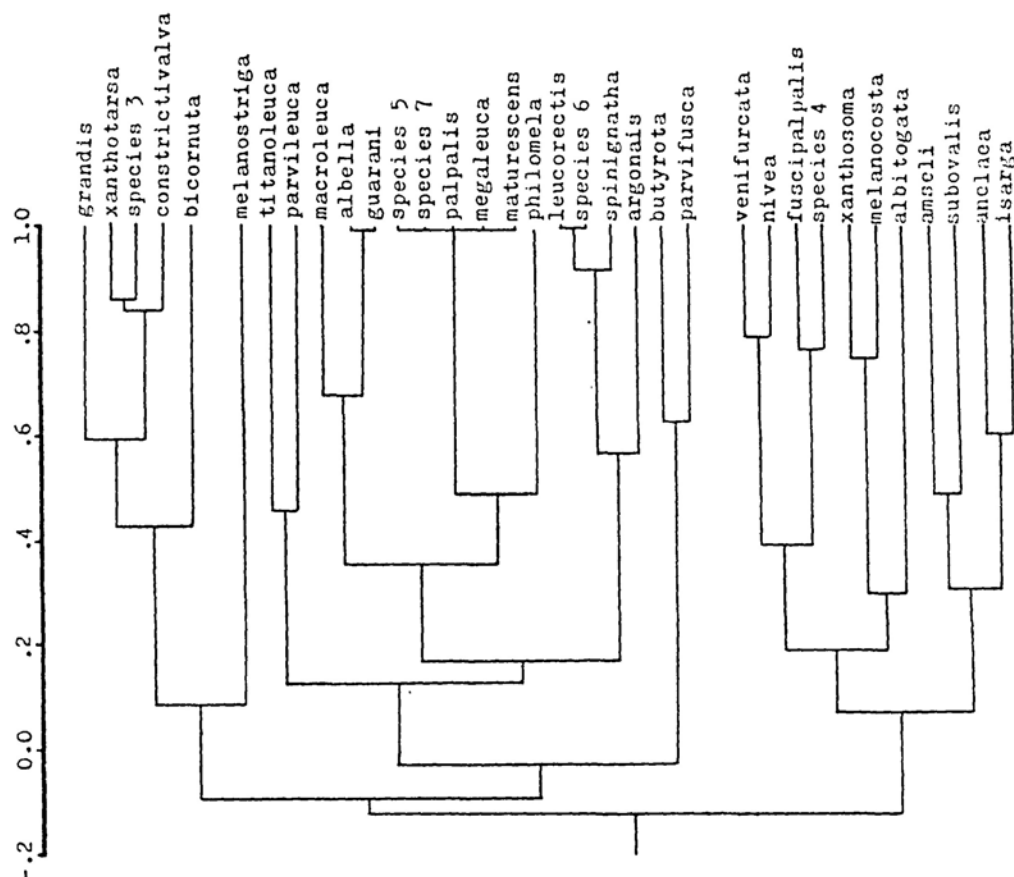
phenogram of the species of the monotonia-group of Timocratica calculated by weighted pair-group method of average linkage from matrix of between OTU taxonomic distance, using unstandardized data. Numbers at top denote magnitude of correlation coefficient.



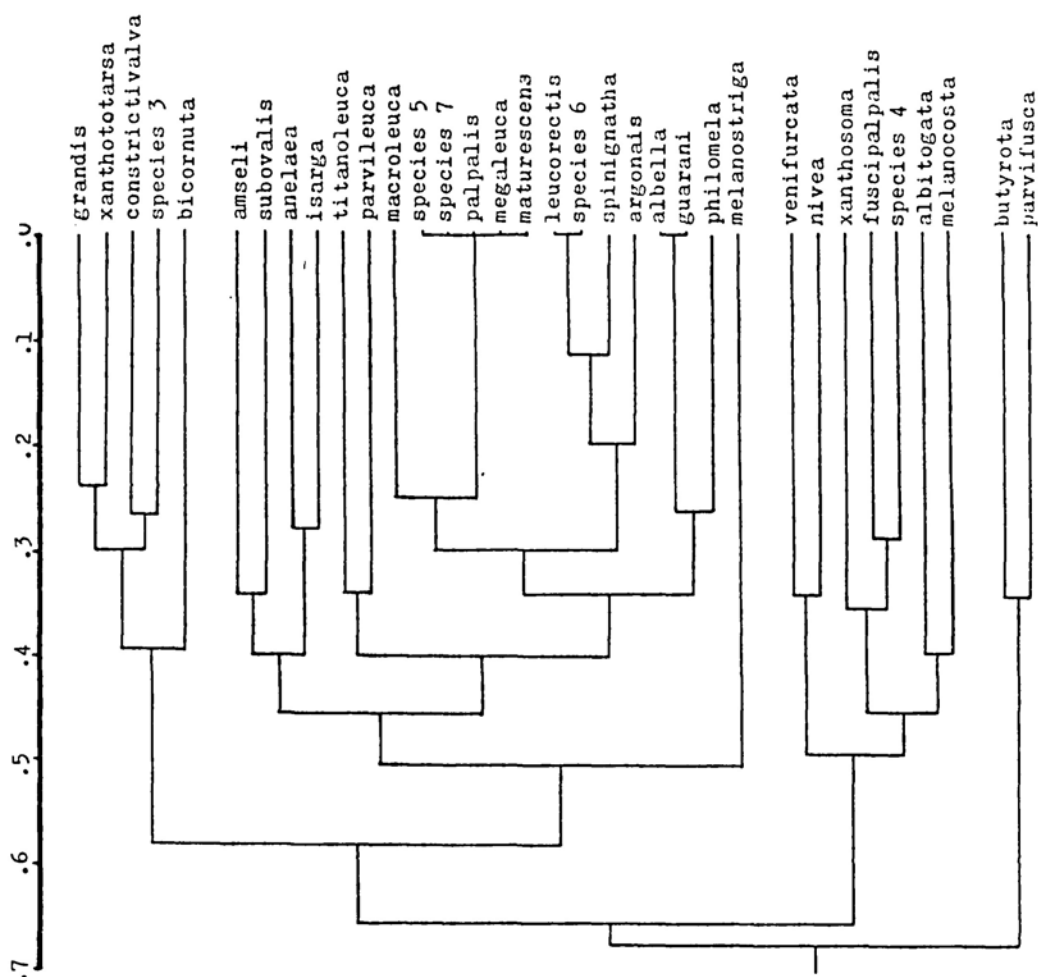
Phenogram of the species of the monotonia-group of Timocratica calculated by weighted pair-group method of average linkage from matrix of between OTU taxonomic distance, using standardized data. Numbers at top denote magnitude of correlation coefficient.



Phenogram of the species of the albella-group of Timocratica calculated by weighted pair-group method of average linkage from matrix of between OTU correlation coefficients, using unstandardized data. Numbers at left-hand side denote magnitude of correlation coefficient.



Phenogram of the species of the albella-group of Timocratica calculated by weighted pair-group method of average linkage from matrix of between OTU correlation coefficients, using standardized data. Numbers at left-hand side denote magnitude of correlation coefficient.



Phenogram of the species of the albella-group of Timocratica calculated by weighted pair-group method of average linkage from matrix of between OTU taxonomic distance, using unstandardized data. Numbers at left-hand side denote magnitude of correlation coefficient.

