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MORPHOMETRIC VARIABILITY OF THE MALLOPHAGAN POPULATIONS (INSECTA, PHTHIRAPTERA, AMBLYCERA AND ISCHNOCERA) FROM THE POLISH AND INDIAN DOMESTIC FOWL (GALLUS GALLUS F. DOM.)

By ELŻBIETA LONC, MARIA MODRZEJEWSKA, ARUN KUMAR SAXENA, JADWIGA ZŁOTORZYCKA and M. C. TRIVEDI

With 6 figures

Usually, the biting lice from two to three families occur on the wild-living birds and each of them is represented by a single but not numerous species. Therefore, there is rarely a coexistence of more than five species. However, the Domestic Fowl (*Gallus gallus* f. *dom.*), the descendant of the Wild Fowl (*G. bankiva*) is a particular host for the biting lice. As a consequence of domestication, that caused greater density in the breedings, together with wide distribution in the world, but at the same time territorial isolation of many bird populations (as well as their evolution steered by a man) – evolutionary trends have also intensified (ZŁOTORZYCKA 1972 a). As a result, the Domestic Fowl serves as a host as many as 13 mallophagan species (ZŁOTORZYCKA 1972 b). There are the representatives of Menoponidae (Amblycera) as well as Goniodidae and Lipeuridae (Ischnocera). Menoponidae (*Menopon, Eomenacanthus, Gallacanthus* and *Uchida*) as well as Goniodidae (*Oulocrepis, Stenocrotaphus* and *Goniocotes*) present the greatest systematic differentiation. The Lipeuridae from the European fowl comprises the genera *Lipeurus, Cuclotogaster, Numidilipeurus* and *Oxylipeurus*. On the other hand, *Numidilipeurus, Oxylipeurus* and *Lagopoecus* from Degeeriellidae – occur on the Domestic Fowl the southern and eastern regions of Asia as well as from some regions of Africa.

Considering that systematic and territorial differentiation of fowl lice, it is worth to convince, if their morphological and morphometric stability is conformable to the present literature data. CLAY (1958) and EICHLER (1963) stated about such stability within particular mallophagan species. It was confirmed by the methods of biometrical analysis of the biting lice from the Pheasants introduced into the hunting territories (MODRZEJEWSKA 1989), and the common ectoparasites occuring on the domestic chickens (LONC 1990). However, it requires testing by the comparison of biometrical and also morphological characters of the biting lice from the localities isolated for a long time.

Such investigations are promising, because LONC & MODRZEJEWSKA (1989) have already showed, using the analysis of variability within species *Goniocotes chrysocephalus*, statistically significant differences not only in synhostal[1] populations, but even within idiohostal lice populations collected from the Pheasants in Poland (Lower Silesia).

The purpose of the present paper is comparative metrical characteristics of synhostal populations of the biting lice including the materials coming from such geographically distant regions as Poland and India.

Material and methods

The object of biometrical studies was five species: *Eomenacanthus stramineus* (NITZSCH, 1866), *Menopon gallinae* (L., 1758), *Goniocotes gallinae* (DE GEER, 1758), *Oulocrepis dissimilis* (DENNY, 1842) and *Lipeurus caponis* (L., 1758). The material came from the flocks of laying hens (*Gallus gallus* f. *dom.*) in the region of Wrocław (Lower Silesia) and Dehradun province (India).

Microscopic preparations of the biting lice were performed both in Poland and India, in the same way, i.e. preservation in 70% ethyl alcohol, maceration with 5% NaOH, washing in water, dehydration on alcohols, lighting up in xylen and mounting in Canadian balsam.

30 males and 30 females of each species from the European (E) and Indian (I) host populations were chosen at random. The length and width of head, thorax and abdomen

[1] According to KISIELEWSKA's (1968) terminology: collection of the parasites from one host specimen forms idiohostal population, from many hosts belonging to the same species – synhostal population, and from different host species – panhostal population. These are ecological formulations and they should not be confused with the terms introduced bei EICHLER (1966), where terms of allo- and synhospital speciation on the lice correspond only to allo- and sympatric speciation of free-living organisms.

differences between corresponding *Myrsidea* populations. That differences was accounted for the fact that in majority cases, host populations inhibiting various areas belonged to distinguished subspecies, it in turn was connected with corresponding division of lice population also into subspecies. However, also the investigations of the biting lice living on *Corvus corone cornix* widely distributed in Europe, have showed (KLOCKENHOFF 1979) the difference among distant populations of *Myrsidea cornicis*. The author put an attention on the fact that such relationships are not always revealed. For example, there were almost the lack of such differences in body dimensions and chaetotaxy between *Myrsidea* populations of *Corvus corone orientalis* from Afghanistan, Japan and Korea despite their territorial isolation.

The method, in the papers mentioned above, are based on total analysis of dimensions of particular body parts in correlation with the chaetotaxy. Therefore, our results, base only on metrical data can not be compared in details. Besides, our analysis had also another aspect. It has been shown, on the base of analysis of variability of some mallophagan species that metrical differentiation within one species populations is slightly different among Polish and Indian populations. Moreover, those metrical differences were considerably significant only in certain species, i.e. *Goniocotes gallinae*. On the other hand, such infraspecies variability were not found between male population of *Lipeurus caponis*. In that case, infraspecies variability of lice is also depended on their microevolutional plasticity. Just Goniodidae to which both *G. gallinae* and *O. dissimilis* belong, and have similar metrical differentiation are also exceptionally partitioned family. It is divided into numerous genera, what testify to evolution expansiveness of that group.

Summary

Populations of poultry lice of five species *Eomenacanthus stramineus* (Nitzsch), *Menopon gallinae* (L.), *Goniocotes gallinae* (De Geer), *Oulocrepis dissimilis* (Denny) and *Lipeurus caponis* (L.) from hens (*Gallus gallus* f. *dom.*) from Poland (Lower Silesia) and India (Dehra-Dun province) served as model material for comparativie studies in order to check if and how spatial (geographical) distance of hosts reflects morphological differentations. The measurements of 60 males and 60 females chosen at random of each species were analysed. Each metrical character was characterized by the arithmetic mean, standard deviation and coefficient of variation. The significant differences among the means were tested by Student test. Lice populations from Poland, particularly belonging to Ischnocera (Goniodidae and Lipeuridae) had greater body sizes and smaller interspecific variability than Indian ones. Coefficient of variation of male morphometric characters, in particular from India was far lower than females. In both sexes of European and Indian members of Amblycera (*Menopon gallinae* and *Eomenacanthus stramineus*) the ranges of variations, first of all head dimensions were nearly equal. However, means of all examined characters of species, except for *M. gallinae* were statistically significant. Among Goniodidae (*Goniocotes gallinae* and *Oulocrepis dissimilis*) the coefficient of difference (CD) established by MAYR as a measure of subspecies differentation was higher than 1.28. It corresponds with great dismemberment of that phylogenic young family and their great plasticity.

Zusammenfassung

Morphologische Variabilität bei Mallophagen-Populationen (Insecta, Phthiraptera, Amblycera und Ischnocera) von polnischen und indischen Haushühnern (Gallus gallus f. dom). Es wurde die intraspezifische Variabilität in Breite und Länge von Kopf, Thorax und Abdomen sowie von der Gesamtkörperlänge bei den Amblyzeren *Eomenacanthus stramineus* und *Menopon gallinae* und den Ischnozeren *Goniocotes gallinae*, *Oulocrepis dissimilis* und *Lipeurus caponis* untersucht. Das Material stammt von Haushühnern aus Niederschlesien (Polen) und aus dem Distrikt Dehradun (Indien). Die Variationsbreiten der Kopfmaße erwiesen sich bei *Menopon gallinae* und *Eomenacanthus stramineus* als nahezu identisch, während sie bei *Lipeurus caponis* nur in der Kopfbreite übereinstimmt. Der arithmetische Mittelwert der Kopfmaße ist mit Ausnahme von *Menopon gallinae* bei allen anderen untersuchten Arten statistisch signifikant. Bei beiden Geschlechtern von *Goniocotes gallinae* und bei den ♂♂ von *Oulocrepsis dissimilis* liegt der Variationskoeffizient bei den Kopfmaßen über den von MAYR zur Unterart-Differenzierung angegebenen unteren Grenzwert (1,28). Das heißt, daß sich jeweils 90 % der Individuen von *Goniocotes gallinae* und *Oulocrepsis dissimilis* nach ihren Körpermaßen sicher der (kleineren) indischen und der (größeren) polnischen Herkunft zuordnen lassen. Die polnischen Herkünfte, insbesondere die der Ischnocera, zeichnen sich gegenüber den indischen einerseits durch größere Körpermaße, andererseits durch niedrigere Variationskoeffizienten aus. Die metrischen Merkmalsvariation der ♂♂ (besonders der indischen) war größtenteils niedriger als bei den ♀♀.

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Author's address:
Dr. Elżbieta LONC
Department of General Parasitology,
Institute of Microbiology
Wrocław University
Przybyszewskiego 63 str.
51-148 Wrocław, Poland

Appendix

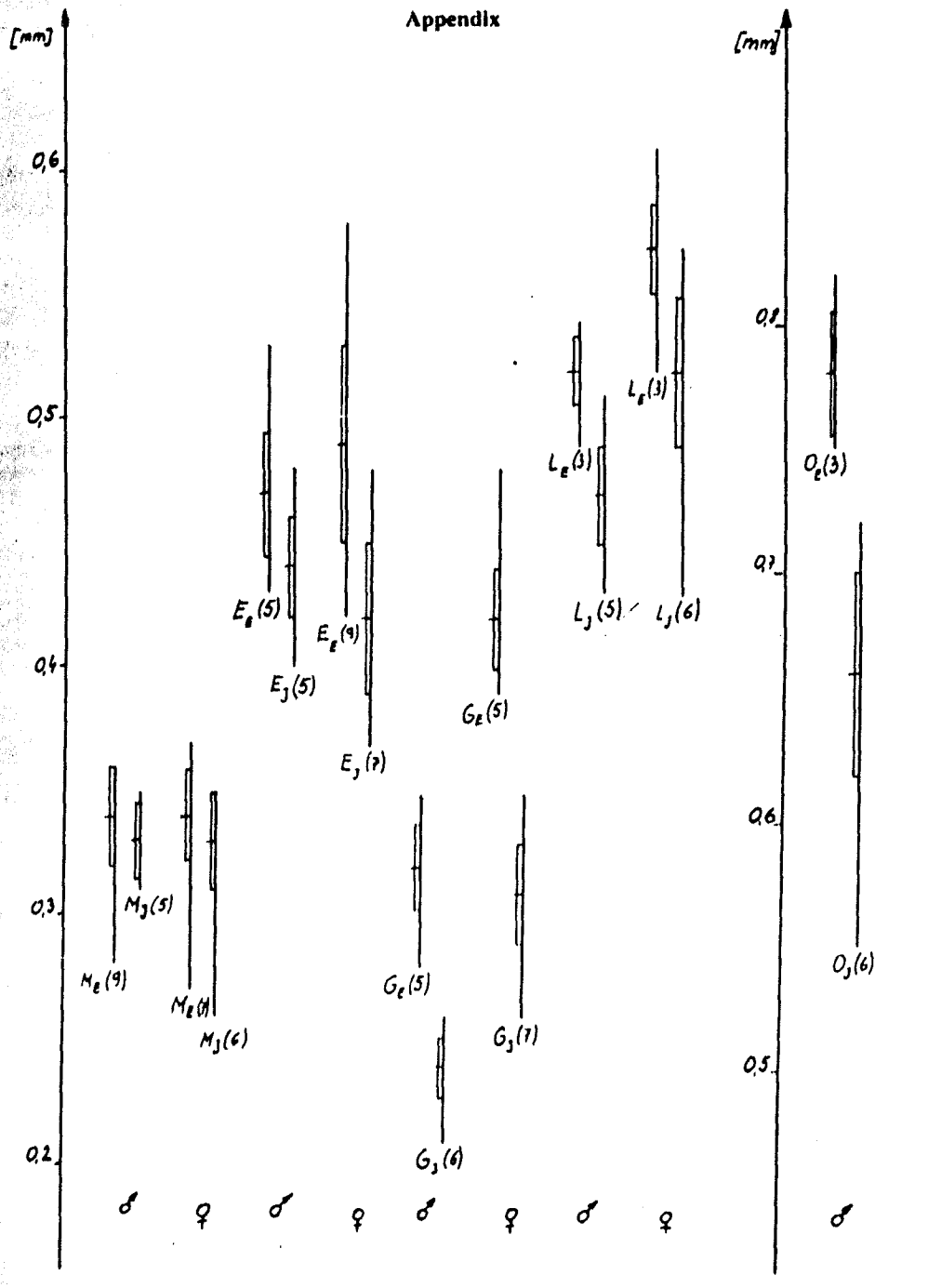

Fig. 1a. Variation of head length in males and females of *Menopon gallinae* (M), *Eomenacanthus strumineus* (E), *Goniocotes gallinae* (G), *Lipeurus caponis* (L) and males of *Colocrepis dissimilis* (O) from the European (E) and Indian (I) population of *Gallus gallus* f. *domestica*, respectively. Vertical lines denote ranges; horizontal – means; bars double the standard deviation and coefficients of variation (%) in brackets. The same designations are at the next figures.

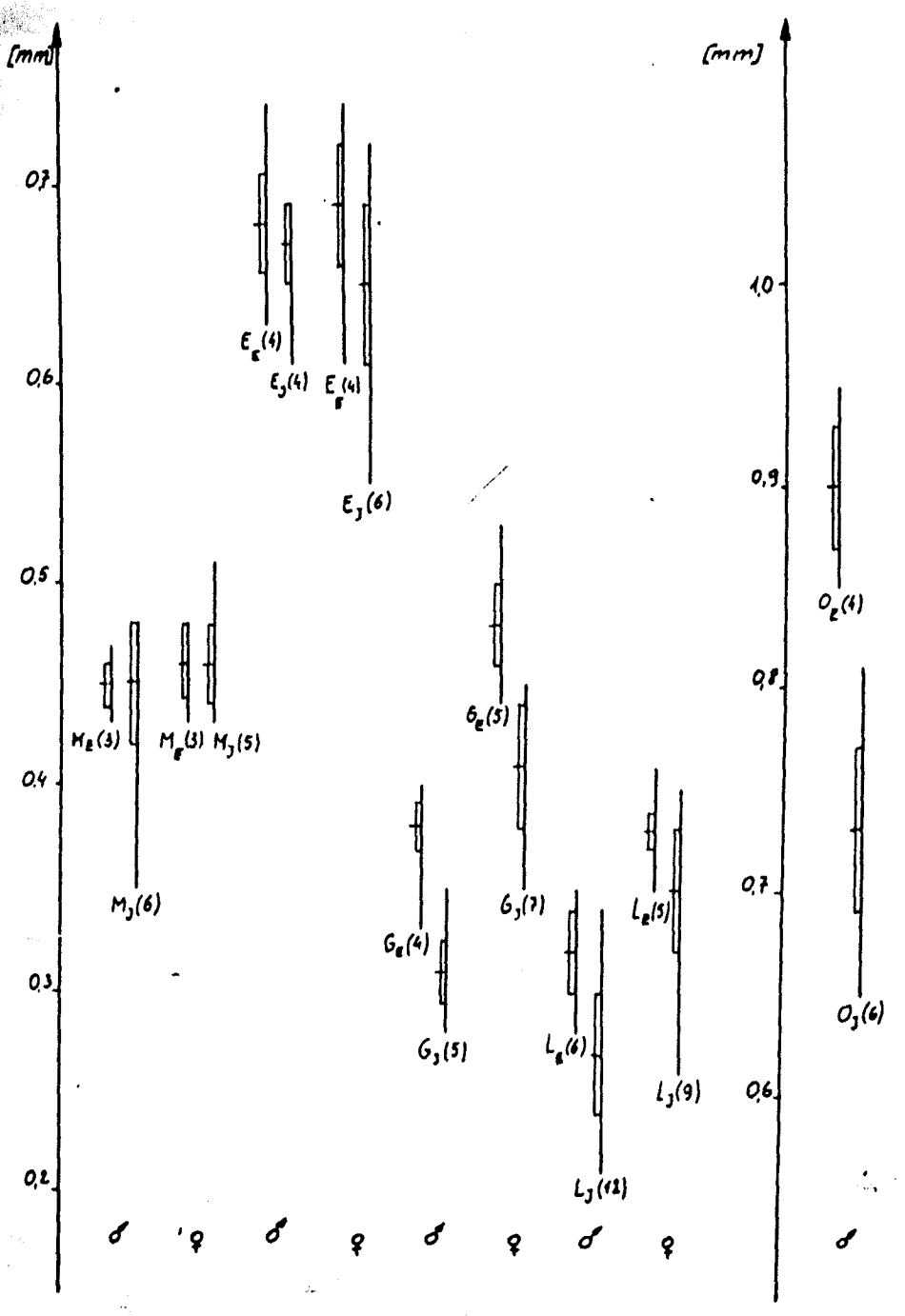

Fig. 1b. Variation of head width in all mallophagan species (designations see fig. 1a).

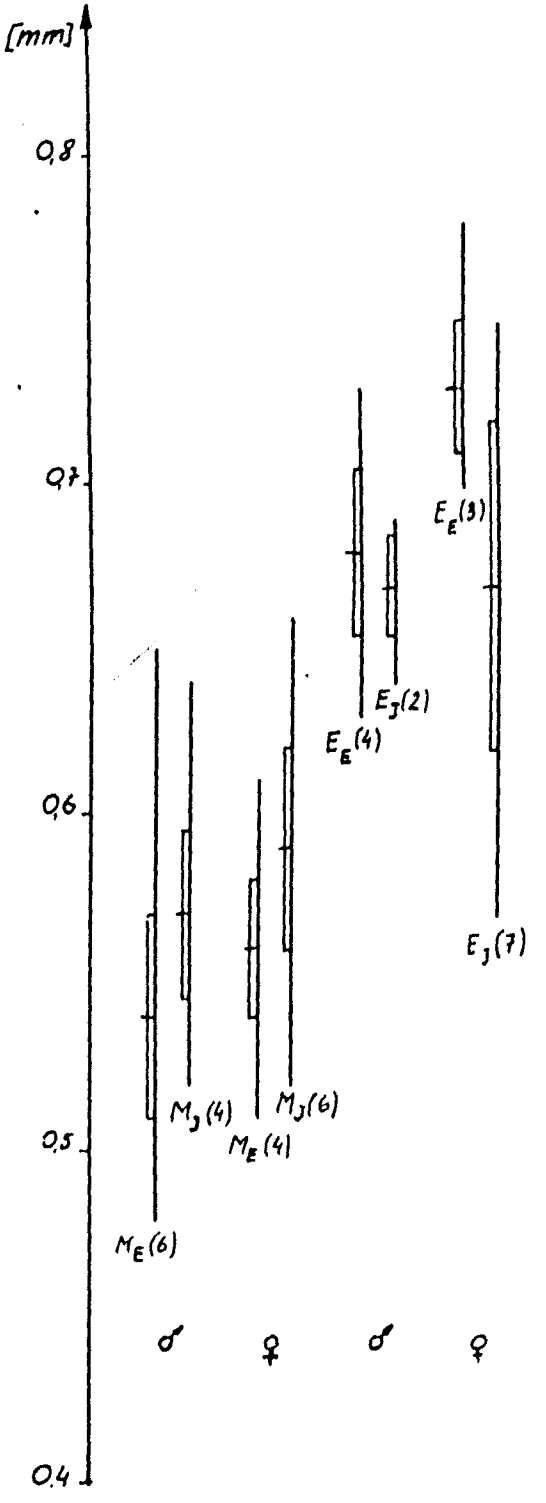

Fig. 2. Variation of thorax width in *Menopon gallinae* and *Eomenacanthus stramineus* (designations see fig. 1a).

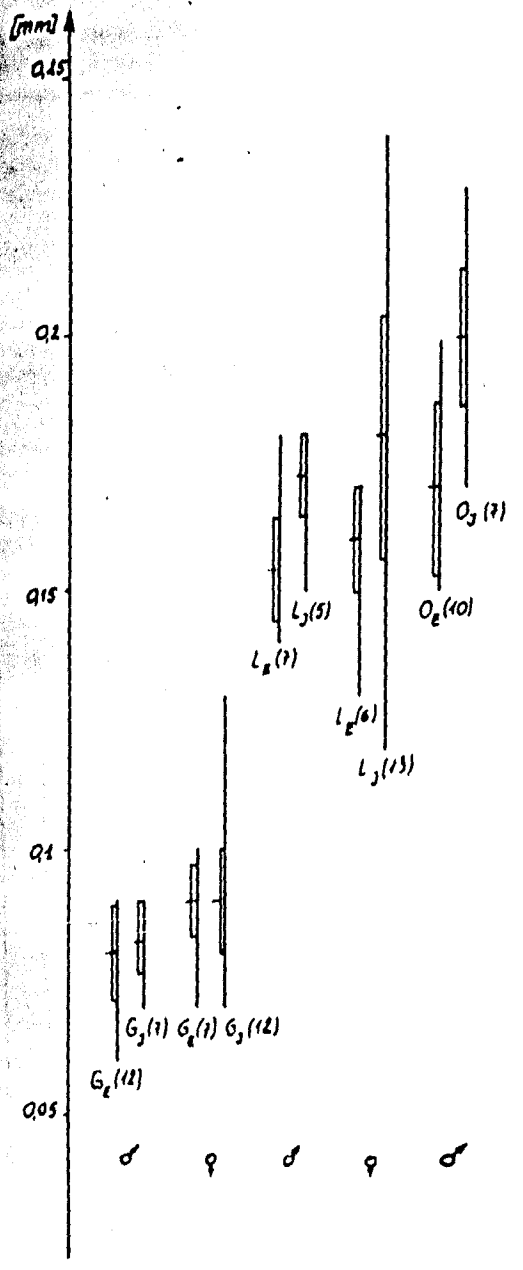

Fig. 3a. Variation of prothorax length in *Goniocotes gallinae*, *Lipeurus caponis* and *Oulocrepis dissimilis* (designations see fig. 1a).

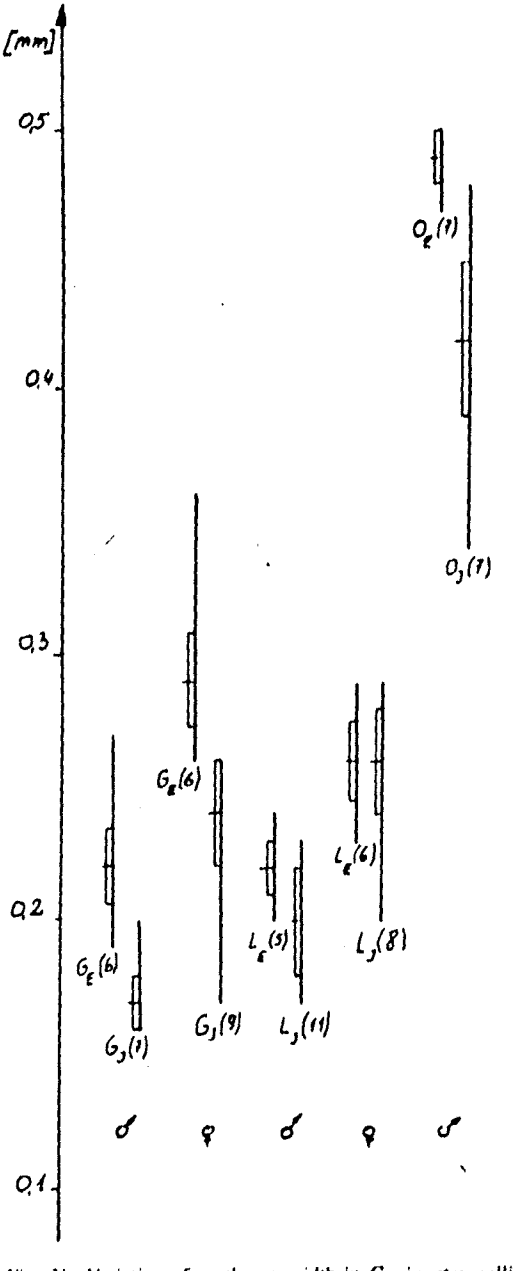

Fig. 3b. Variation of prothorax width in *Goniocotes gallinae*, *Lipeurus caponis* and *Oulocrepis dissimilis* (designations see fig. 1a).

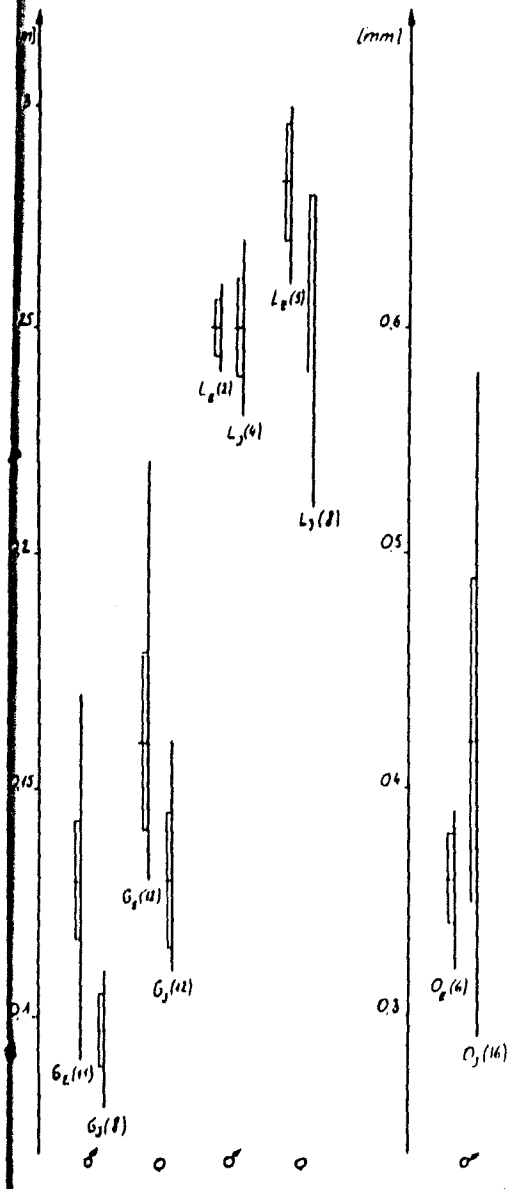

Fig. 4a. Variation of pterothorax length in *Goniocotes gallinae*, *Lipeurus caponis* and *Oulocrepis dissimilis* (designations see fig. 1a).

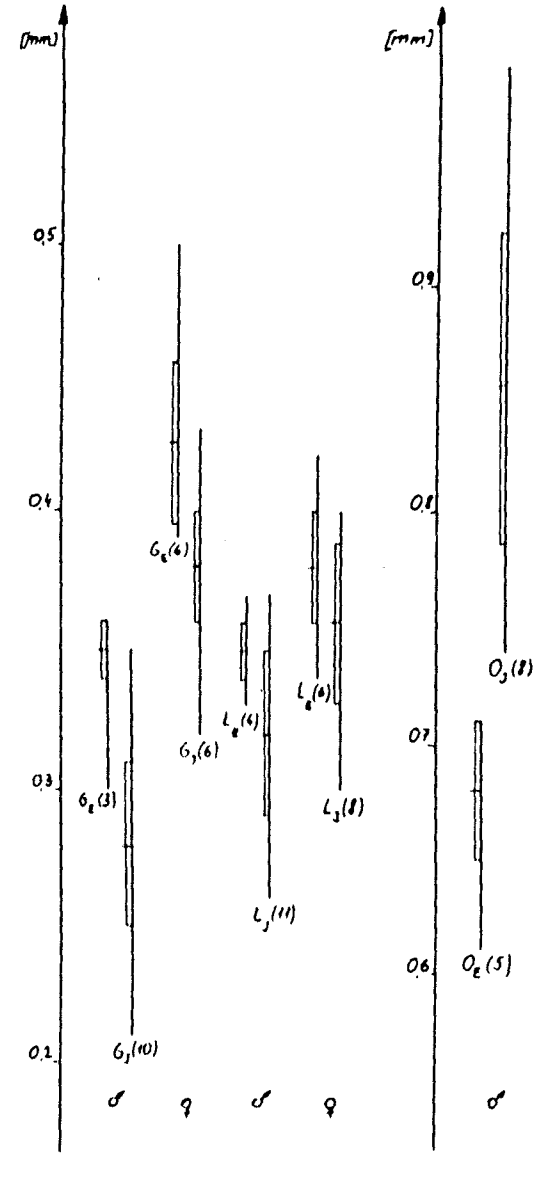

Fig. 4b. Variation of pterothorax width in *Goniocotes gallinae*, *Lipeurus caponis* and *Oulocrepis dissimilis* (designations see fig. 1a)

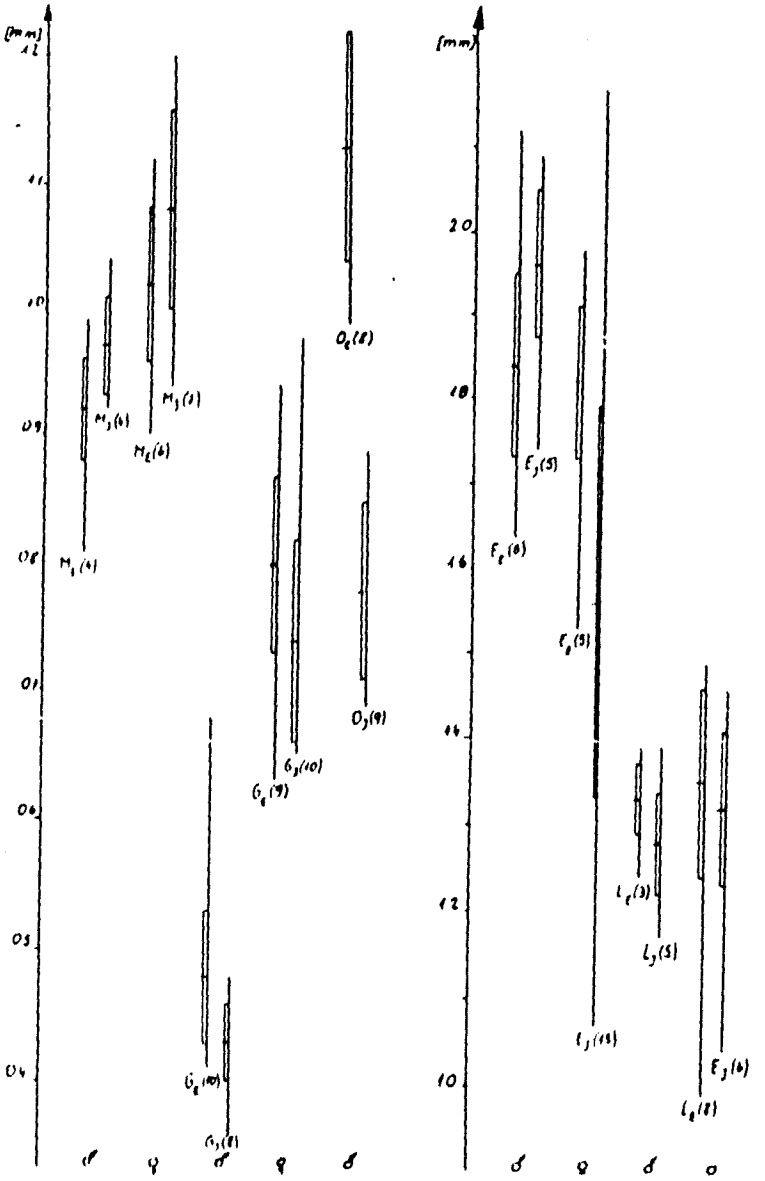

Fig. 5a. Variation of abdomen length in *Goniocotes gallinae*, *Lipeurus caponis* and *Oxylipeurus dissimilis* (designations see fig. 1a).

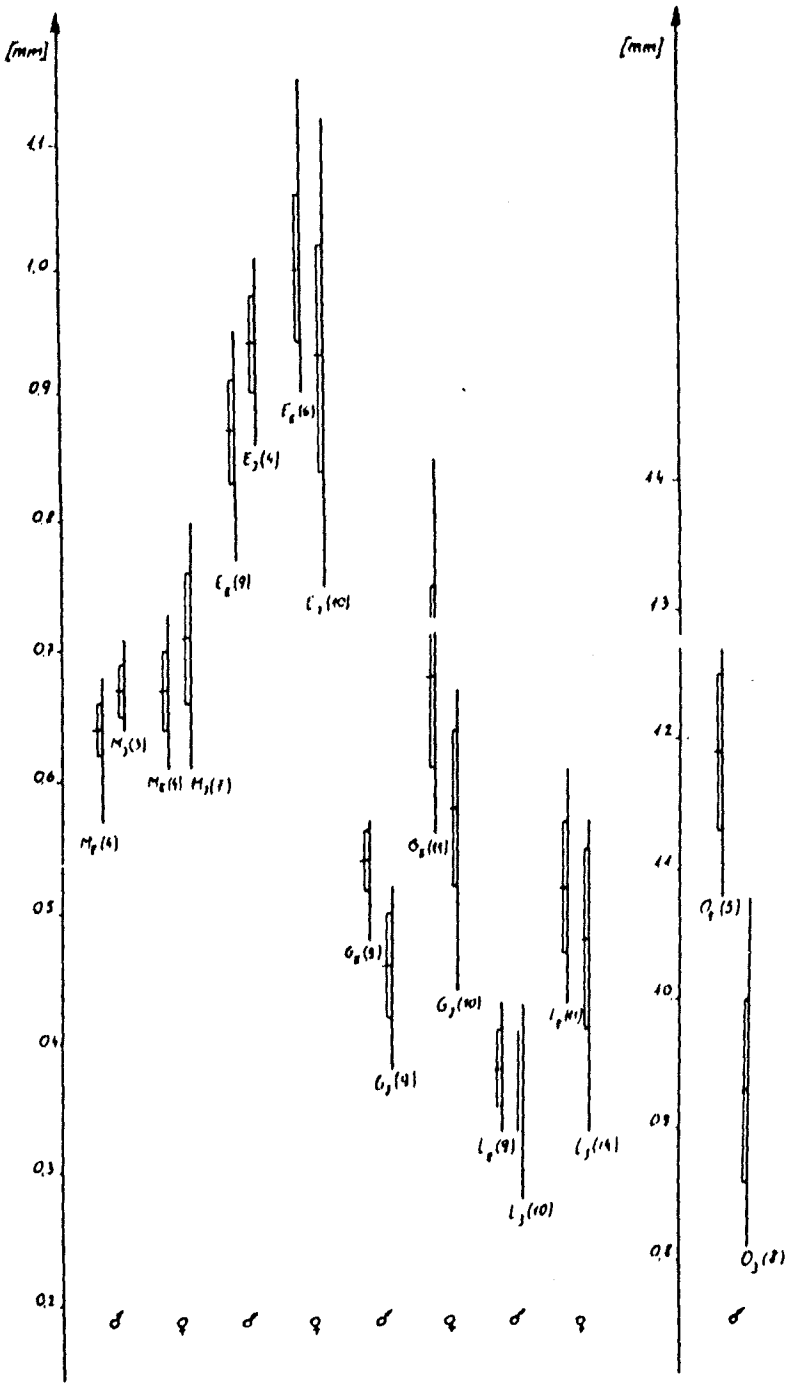

Fig. 5b. Variation of abdomen width in *Goniocotes gallinae*, *Lipeurus caponis* and *Oulocrepis dissimilis* (designations see fig. 1a).

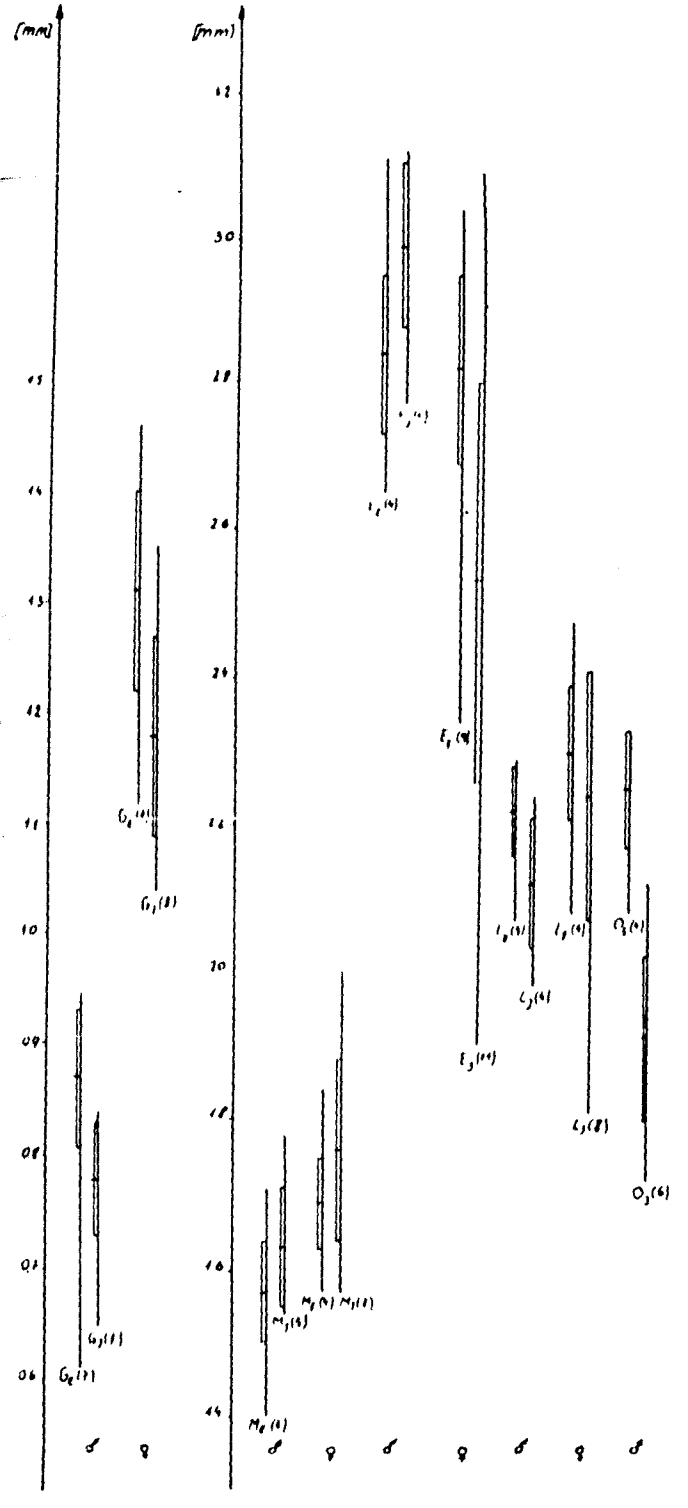

Fig. 6. Variation of total length in all mallophagan species (designations see fig. 1a).