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**Mites of the genus *Pergamasus* BERLESE, 1903 (*Acarina*, *Parasitidae*),
group *Crassipes* sensu MICHERDZIŃSKI, 1969**

[Pp. 669—682, 9 text-figs.]

**Roztocze z rodzaju *Pergamasus* BERLESE, 1903, (*Acarina*, *Parasitidae*), grupy *Crassipes*
sensu MICHERDZIŃSKI, 1969**

**Гамазовые клещи-паразиты рода *Pergamasus* BERLESE, 1903. (*Acarina*, *Parasitidae*),
из группы *Crassipes* sensu MICHERDZIŃSKI, 1969**

Abstract. Author gives the differences between *Pergamasus brevicornis* BERL. and *P. mediocris* BERL. The description of *P. laminarius* n. sp. similar to *P. mediocris* BERL., is presented.

INTRODUCTION

The main methods of determination of the membership of females and males in the same species of the genus *Pergamasus* BERL., 1903 have hitherto been based on morphological criteria and the fact of their occurrence in the same sample. In the light of recent studies (e. g., MICHERDZIŃSKI, 1969), however, these methods appear unreliable. Nearly all the fundamental systematic characters, i. e., those of gnathosoma, chelicerae, tectum, legs of pair IV, and chaetotaxy, may differ considerably between males and females. Neither can the methods which join males and females in species on the basis of their proportional share in the sample be used in a case when several species approximate to each other in number in the sample and in other cases such a method does not provide enough evidence for the membership of specimens of both sexes in the same species. Another difficulty is the fact that in some periods of the year there may be a nearly complete lack of males coinciding with a fairly abundant occurrence of females. In the group *Crassipes* of the genus *Pergamasus*

this state is, in addition accompanied by the poor morphological differentiation, especially in females, although in males the main character used for their specific division morphology of leg II, is also rather an arbitrary and unreliable character. As a result, only males have been described for most species of this group.

MATERIAL AND METHOD

In the present study an attempt has been made to apply new criteria which spring from the modern notion of biological species, namely: a) the fact of copulation of a male and female and b) the rearing of the fertilized females so as to obtain males from their eggs.

The material for rearing was collected by sifting litter with a sieve. Next, a part of the material was placed in a TULGREEN photoeclector, whereas live specimens were picked out from the remaining part and kept in chambers (Fig. 1), on damp sand so as to prevent them from drying (COSTA, 1966).

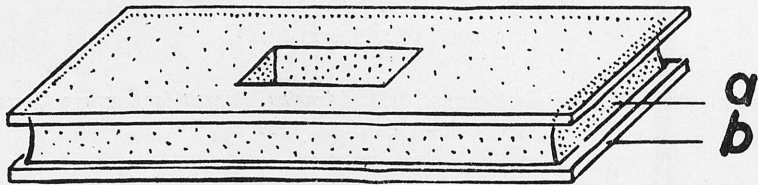


Fig. 1. The chamber; a — gypsum, b — glass

At the beginning, several males and females of different species were kept in one chamber to render copulation possible. After 24 hours, all the non-copulating females were removed to separate chambers, and preparations were made from the copulating pairs. The females that did not copulate had probably been fertilized before, in the litter.

The chambers were inspected, food (enchytraeids) offered, and eggs or larvae removed to separate chambers. In this way I managed to effect the whole developmental cycle. The obtainment of males from eggs through the larval stages made it possible to determine their specific membership.

The study covered females and males of *Pergamasus brevicornis* BERLESE, 1905 and *Pergamasus mediocris* BERLESE, 1905. A list of localities and numbers of specimens are given in Table I.

The identification of males of these two species with the descriptions given by BERLESE (1905) was based on the agreement of the following characters with the drawings presented by him: long leaf-like apophysis on genu II, trochanter IV with tubercles, of which the ventral one is the most distinct, in *P. brevicornis* BERL., and round tuberos apophysis on genu II and digitus mobilis of the chelicera with a strong proximal tooth larger than in the previous species in *P. mediocris* BERL. It was, however, impossible to identify females on the basis of these descriptions.

Table I

Locality and numerical force of *P. brevicornis* and *P. mediocris*

Locality	<i>Pergamasus brevicornis</i>		<i>Pergamasus mediocris</i>	
	Male	Female	Male	Female
Babia Góra	—	2	—	5
Bieszczady	17	38	—	—
Cergowa	15	15	—	—
Grabowiec	3	5	—	—
Las Wolski	3	10	—	—
Ojców	1	1	1	3
Rudawa	2	13	2	12

RESULTS

A comparison of the occurrences of specimens of both sexes in particular populations could not be used as a criterion for referring them to a given species, since males of both species were found with females in three samples and in the remaining three samples, in which males of only one species occurred with females, we may have been concerned with the situation brought about by the incidental collection of specimens of both sexes belonging to different species (Table I). A morphological analysis of females revealed the occurrence of two different forms of the endogynium in them: one having a narrow border, with two pointed processes (only one of them may be very slightly forked), which are not turned towards the basal portion of the endogynium (Fig. 2A), and the other having a broad border, with thickened processes and at the end dentated, directed more or less exactly towards the basal portion of the endogynium (Fig. 2B).

Observations of living animals and their breeding in the laboratory showed that females with the endogynium as in Fig. 2 A copulated only with males identified as *P. brevicornis* BERL. and those with the endogynium as in Fig. 2 B with males identified as *P. mediocris* BERL. From the eggs of females with one of the two endogynium types described I always obtained females that had their endogynium analogous with that of their mother. The shape of the endogynium is, therefore, a hereditary character reproduced invariably in female offspring and not a sign of intraspecific variation. Males of *P. brevicornis* BERL. were obtained from the fertilized eggs of the females with the endogynium as in Fig. 2A and those of *P. mediocris* BERL. from the eggs of the females with the endogynium as in Fig. 2B.

The results of rearing unambiguously confirm the opinion that the females with the endogynium as in Fig. 2A belong to the species *P. brevicornis* BERL.

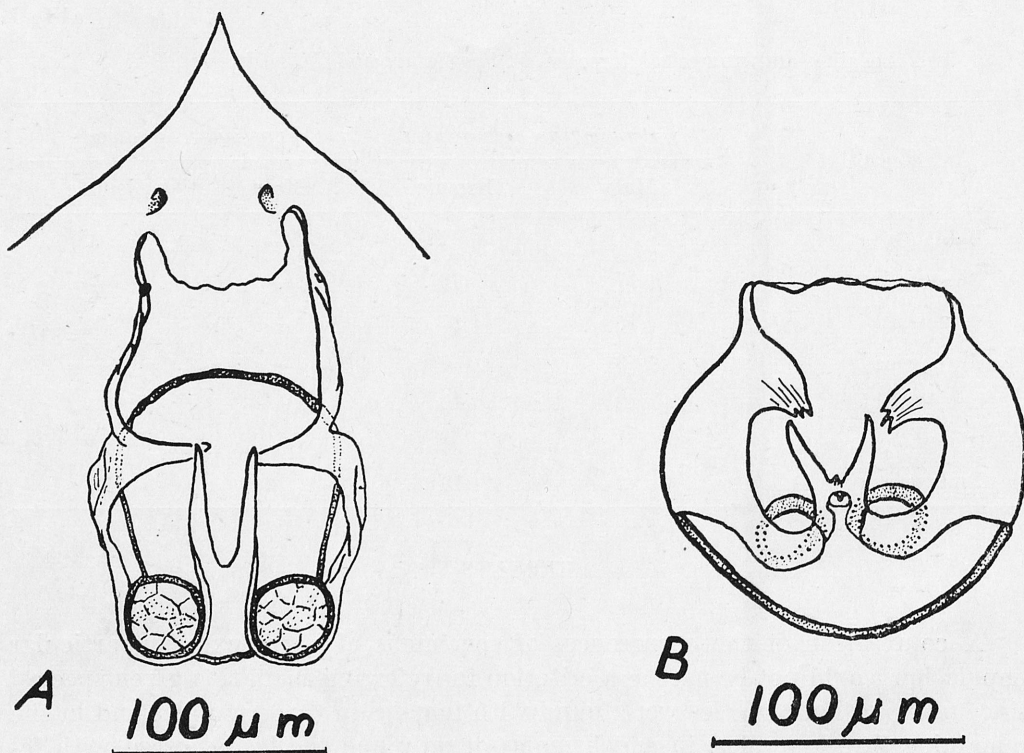


Fig. 2. Female-endogynium (after MICHERDZIŃSKI, 1969) A — *Pergamasus brevicornis* BERL., B — *P. mediocris* BERL.

and the females with the endogynium as in Fig. 2 B to the species *P. mediocris* BERL. The only common character that has been established for both sexes in these two species is the shape of the tarsus of leg IV. Both in males and females tarsus IV is slender and tapering regularly towards the end (Fig. 3 C, D) in *P. mediocris* BERL., whereas in *P. brevicornis* BERL. it thickens in the middle portion and narrows abruptly in the terminal portion to form a kind of peg with more or less parallel walls (Fig. 3 A, B). In both sexes of *P. brevicornis* BERL. there also occurs a thickened ridge on the inner side of the trochanter palpi and it terminates below seta V2, seta V1 growing out of a small elevation.

A rather unreliable character is the shape of the processes and apophyses on leg II of males, for the appearance of the apophyses on tibia II depends to a high degree on the arrangement of the preparation. In *P. brevicornis* BERL. the apophysis on genu II has the shape of a sellar ridge, and on tibia II there are two apophyses, of which one is larger and longer and the other (the side one) is evidently smaller (Fig. 4 A). In *P. mediocris* BERL. the apophysis on genu II is tuberosus, and on tibia II there are two apophyses of approximately the same size, situated side by side (Fig. 4 B). The spur on femur II does not show a clear-cut differentiation in these species.

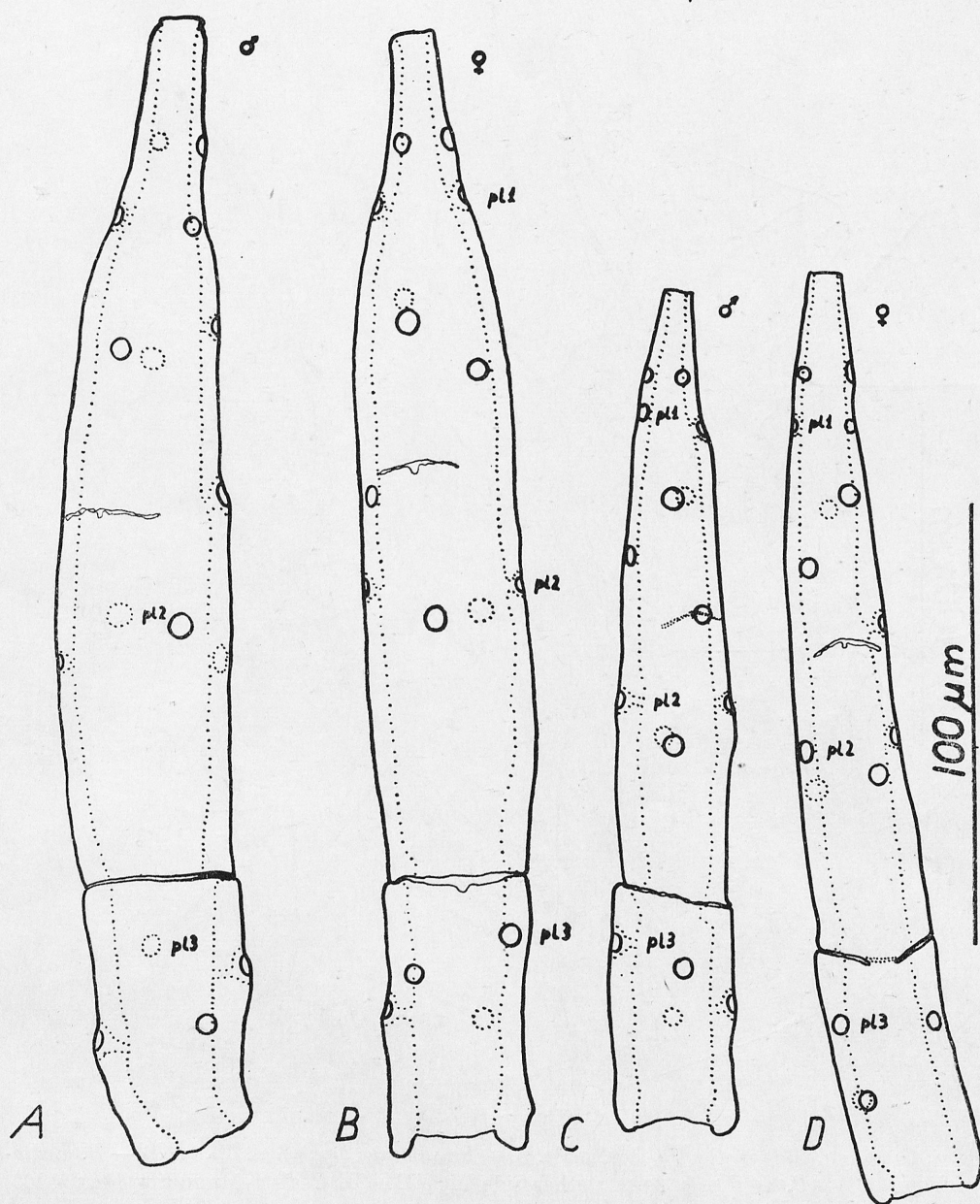


Fig. 3. Tarsus IV. A — *Pergamasus brevicornis* BERL., male, B — *P. brevicornis* BERL., female, C — *P. mediocris* BERL., male, D — *P. mediocris* BERL., female

A comparison of the present results with the descriptions provided by literature has shown that as far as the two species under study are concerned there is a general misunderstanding and great confusion. Thus, for instance, out of the recent authors, ATHIAS-HENRIOT (1967) describes a male as a new species, *P. pulvinicrus*, but her drawings of leg II and trochanter IV of this new species

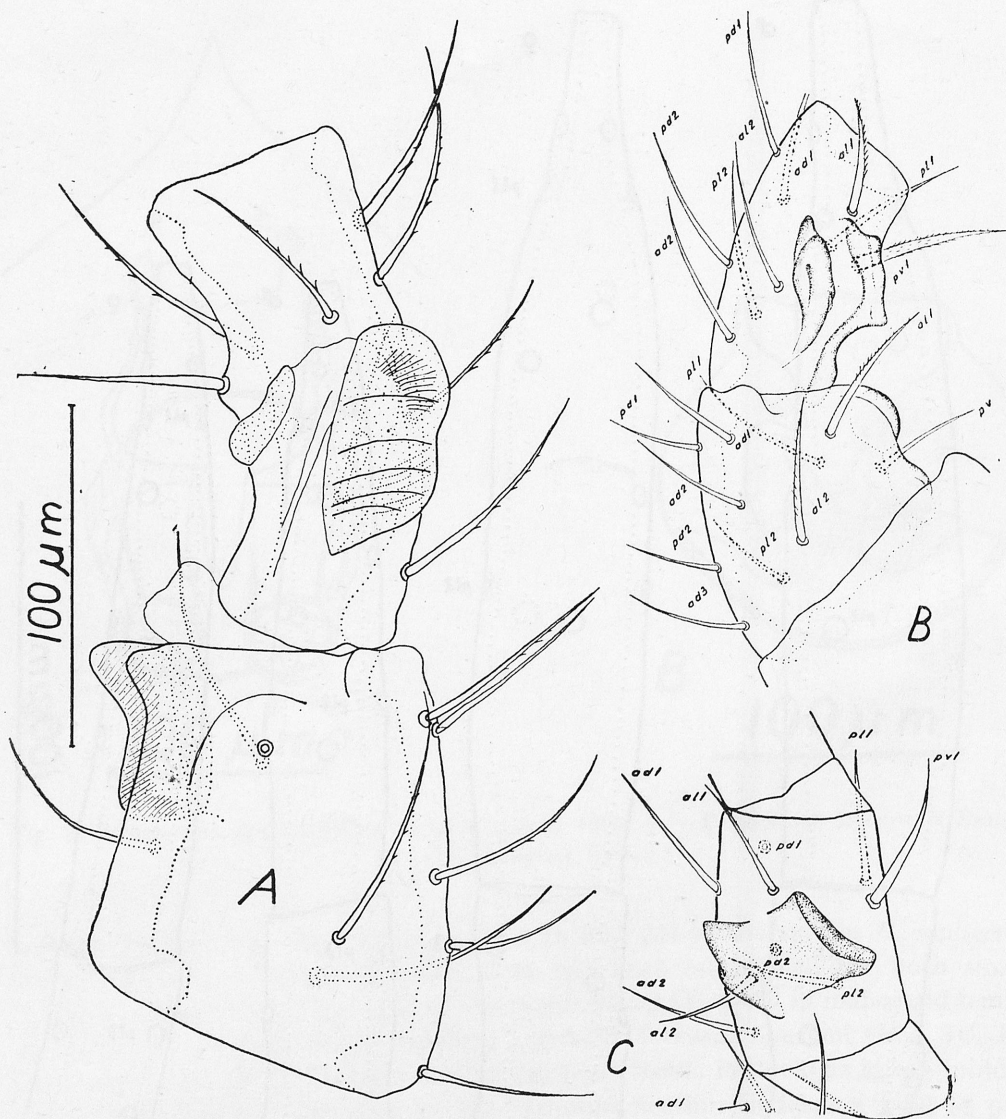


Fig. 4. Genu and tibia of the leg II of male. A — *Pergamasus brevicornis* BERL., B — *P. medioeris* BERL., C — *P. medioeris* BERL., other side of Ti II (B, C after MICHARDZIŃSKI, 1969)

indicate unambiguously that it is *P. brevicornis* BERL. 1905. The authoress does not describe the female of this species. In the same paper she is inclined to synonymize *P. brevicornis* BERL., 1904 with *P. medioeris* BERL., 1904, but she provides both these names with a question mark. Her drawings of the genu and tibia of leg II of a male and that of the endogynium of a female show clearly that they represent a male and female of *P. medioeris* BERL.

Neither does MICHARDZIŃSKI (1969) distinguish these two species, since his drawings of legs II of males indicate that here we are concerned with males

of *P. mediocris* BERL., 1905, and the differences in appearance between legs II presented in the drawings have been caused by their different arrangement in preparations. Describing females of *P. brevicornis* BERL., 1903, the same author presents the drawings of both forms of the endogynium, which correspond with Figs. 2A and 2B. This has also been confirmed by the results of an analysis of the respective preparations borrowed for this purpose from Dr. MICHERDZIŃSKI.

As regards the old descriptions, it should be mentioned that BERLESE used the name *P. brevicornis* in his paper as early as 1903 and *P. mediocris* in the paper from 1904, but the descriptions given in these papers do not allow their identification. More detailed descriptions and drawings which render identification possible occur in the publication from 1905. The description of a male of a new species *P. sudeticus* PAX et WILLMANN, 1937 allows its identification with male *P. mediocris* BERL., 1905. On the other hand, the description of *P. brevicornis* BERL. by TRÄGARDH (1910) agrees with that given by BERLESE in 1905.

Thus, according to the results of the present study, the nomenclature of these two species would present itself as follows: *Pergamasus brevicornis* BERLESE, 1903, sensu BERLESE, 1905, sensu TRÄGARDH, 1910 non MICHERDZIŃSKI, 1969 = *P. pulvinicrus* ATHIAS-HENRIOT, 1967.

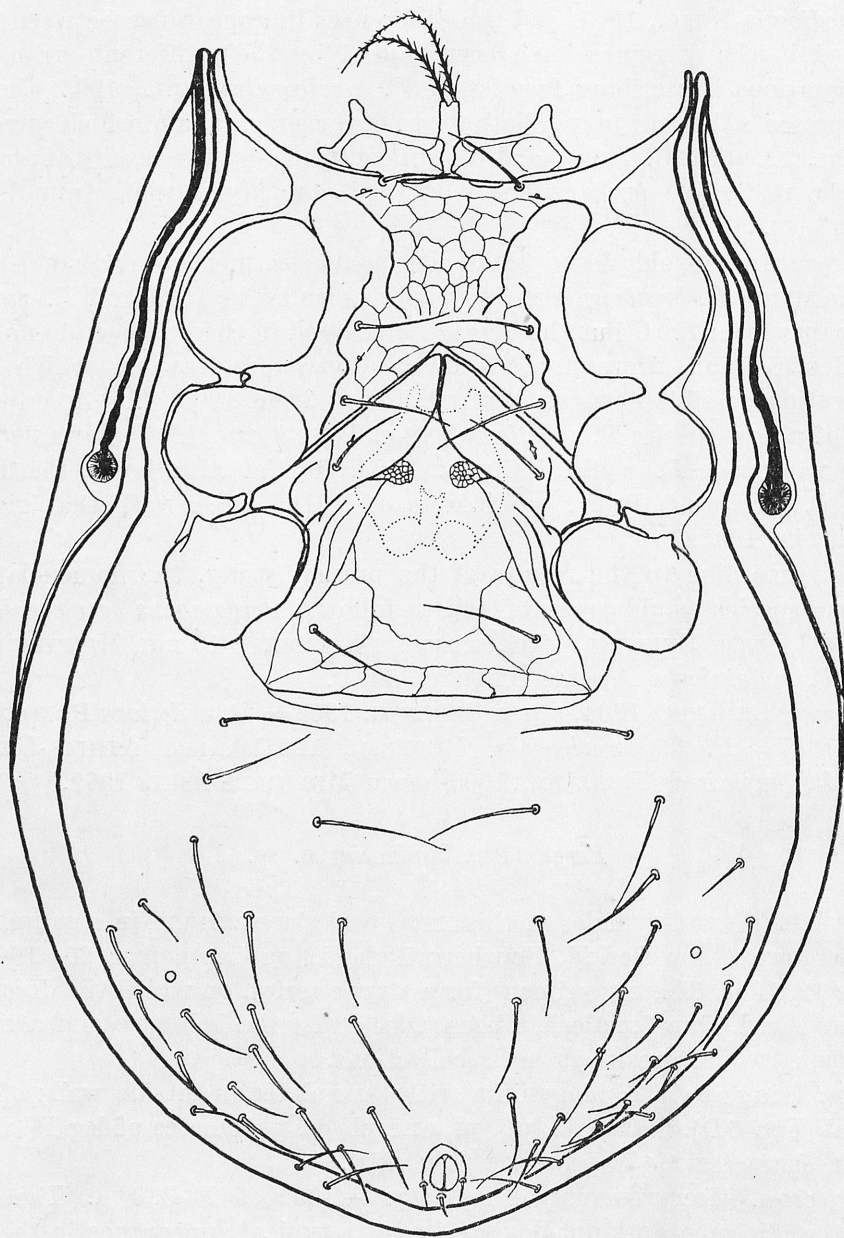
P. mediocris BERLESE, 1904, sensu BERLESE, 1905 = *P. sudeticus* PAX et WILLMANN, 1937 = *P. (?) brevicornis* (BERLESE, 1904) sensu ATHIAS-HENRIOT, 1967 = *P. brevicornis* BERLESE, 1903 sensu MICHERDZIŃSKI, 1969.

Pergamasus laminarius n. sp.

Five females and 2 males of this new species were found in a sample from Góra Cergowa (Low Beskid, Southern Poland) on September 20, 1968 and October 12, 1969. These specimens form a type series, on which the description has been based. One female has been selected as the holotype and a male as an allotype, which are in author's collections.

Female: Diagnosis. Endogynium with several teeth on side walls of circular canal (Fig. 6D). Setae pv_1 , pl_1 , pl_2 and pl_3 on podomeres of leg IV marked by their characteristic appearance (Fig. 7B).

Description. Measurements of idiosoma — $1000 \times 540-590 \mu$. The dorsal side of the idiosoma does not deviate from its typical appearance in the group Crassipes. The ventral side (Fig. 5) differs from other species, above all, in the shape of the paragynia (Fig. 6A) and endogynium. The length of the endogynium is subequal to its width. The distinctive characters are the lack of the transverse lateral processes which occur, e. g., in *P. brevicornis* BERL. or *P. crassipes* BERL. and the presence of teeth on the internal side of the circular canal. Gnathosoma: tectum (Fig. 6C) with 5 teeth equally well developed and disposed at equal intervals. Hypostome (Fig. 6B) with $Q = 13$ (regular arrangement), laminae on laciniae thin and reaching up to their ends. Seta G_1 smooth, setae



500 μm

Fig. 5. *Pergamasus laminarius* n. sp., female. Ventral side of idiosoma

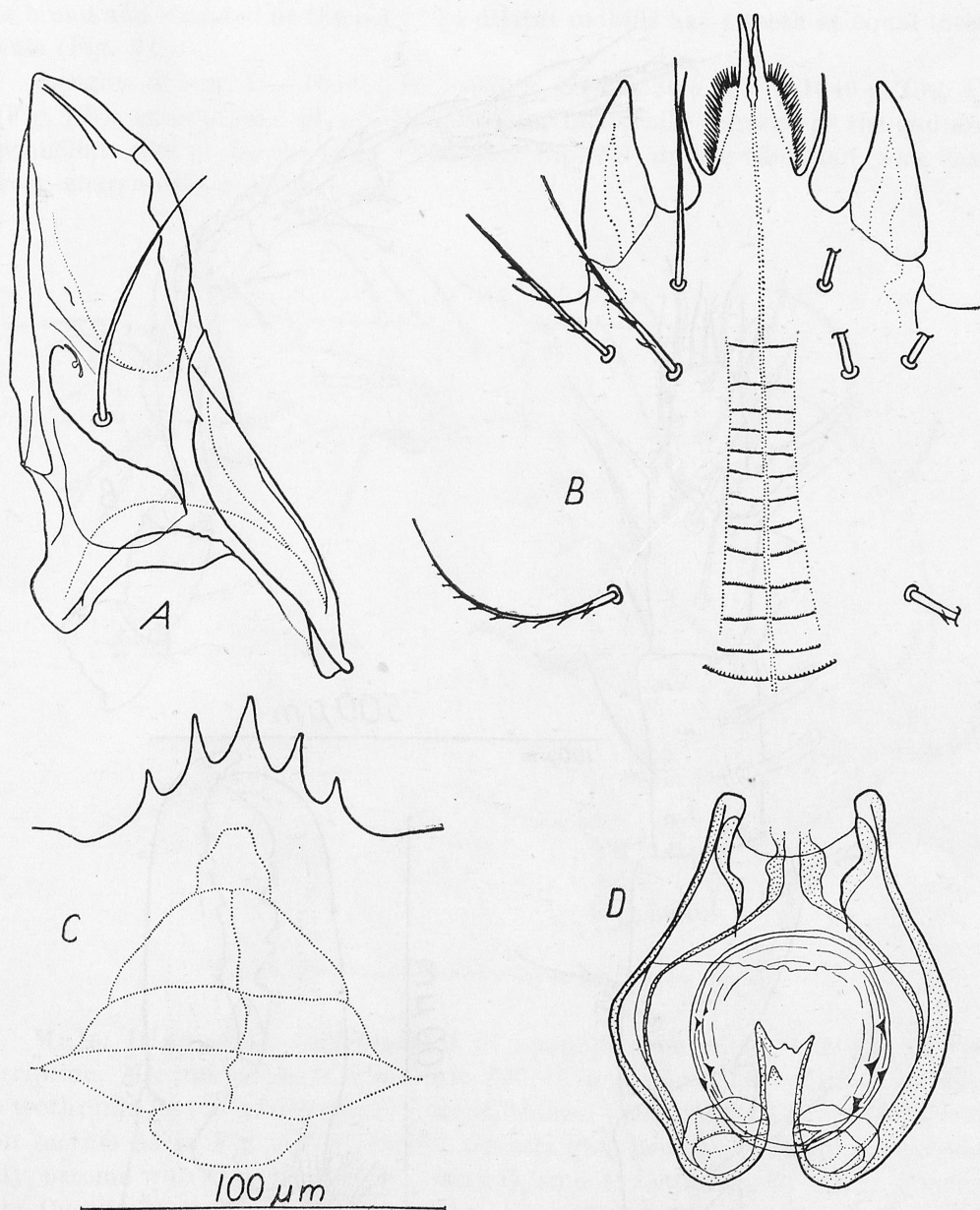


Fig. 6. *Pergamasus laminarius* n. sp., female. A — paragynium, B — gnathosoma, C — tectum, D — endogynium

G_2 , G_3 and G_4 serrate. Trochanter palpi with slightly thickened notch on lateroventral side (Fig. 7A). Seta v_1 serrate, v_2 smooth. The digitus fixus of the chelicera (Fig. 7C) has two laminae on its internal edge, running from the base approximately half-way along it, and followed by two teeth, pilus dentilis and, immediately behind this last, still another tooth. The synarthroidal membrane

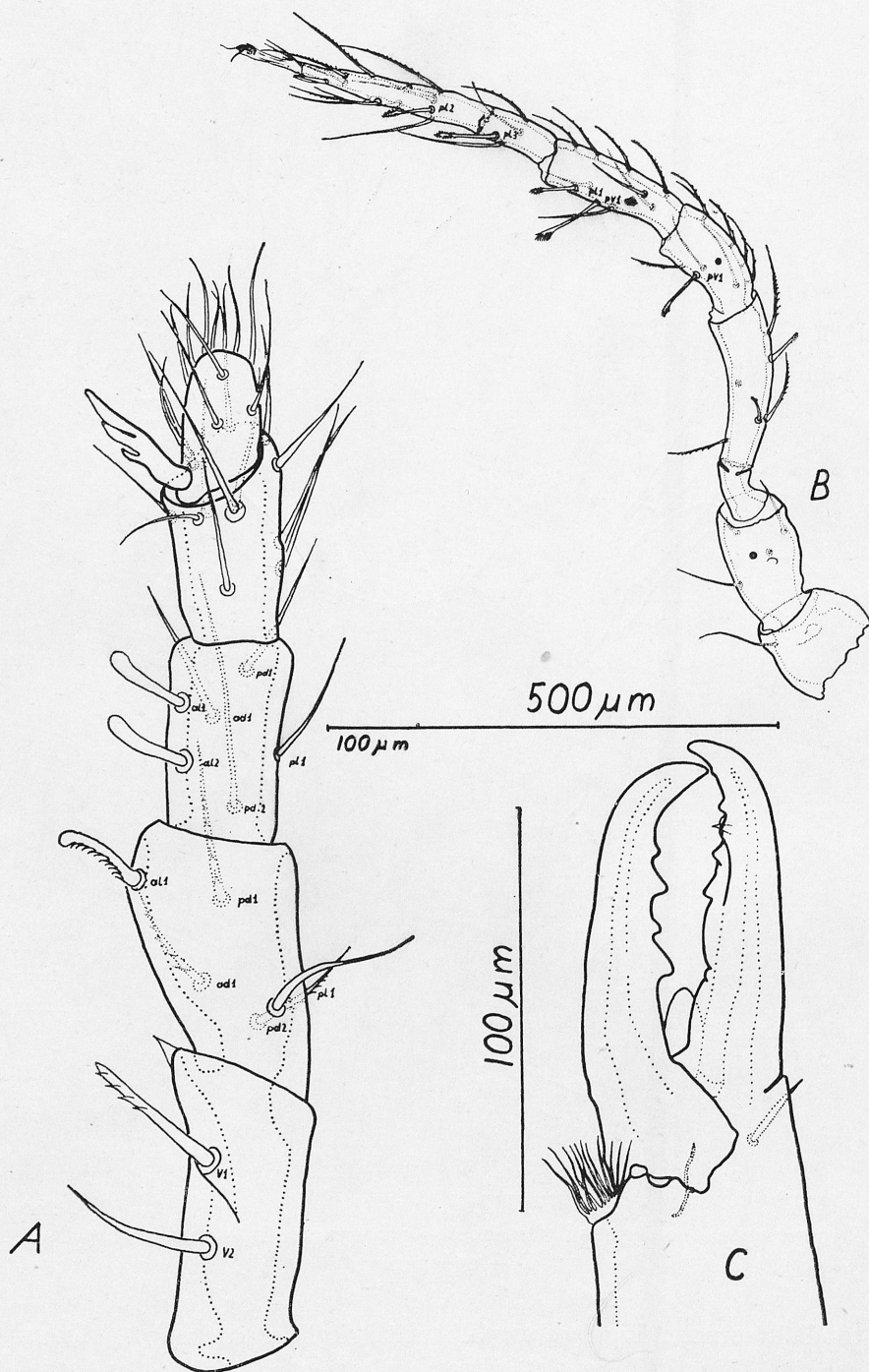


Fig. 7. *Pergamasus laminarius* n. sp., female. A — pedipalp, B — leg IV, C — chelicera

is broad and rounded at the end. The digitus mobilis has 4 teeth at equal intervals (Fig. 7C).

Lengths of legs: I — 1060 μ , II — 670 μ , III — 580 μ , IV — 1040 μ . Leg. IV (Fig. 7B): setae pl_2 and pl_3 on the tarsus are bilaterally serrated at the end and penicillate like pl_1 on the tibia. Setae pv_1 (Fig. 7B) on the tibia and genu have very characteristic endings.

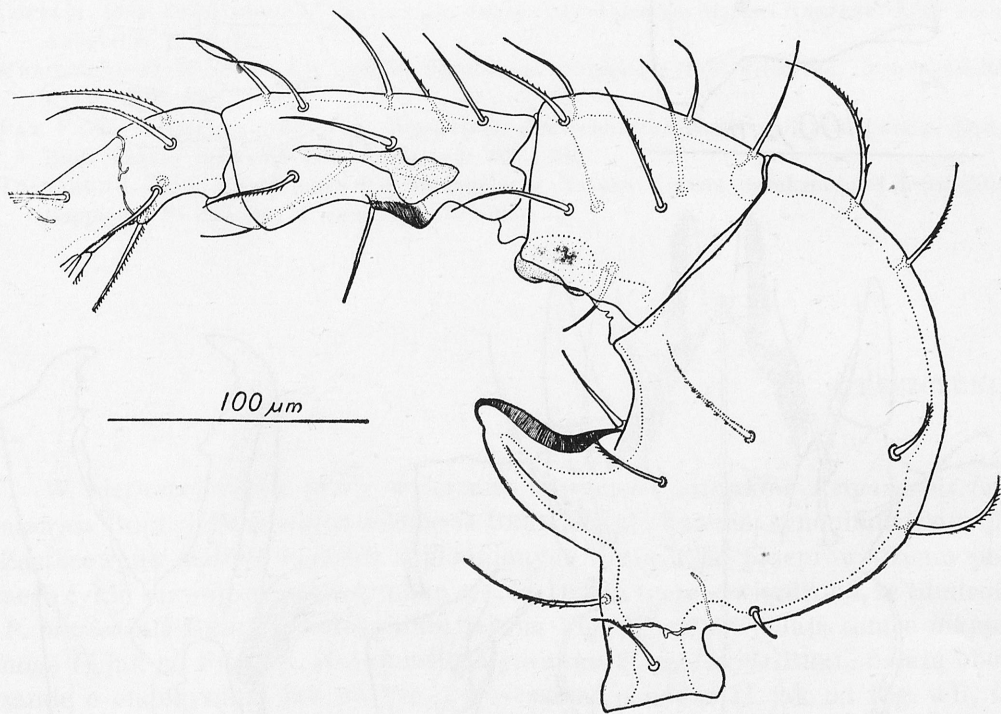


Fig. 8. *Pergamasus laminarius* n. sp., male. Leg II

Male: Diagnosis. Development of apophyses on tibia II as fig. 8. Description. Measurements of idiosoma: 890×570 μ . Gnathosoma: tectum with 5 teeth; middle tooth longer and more chitinized than others; structural pattern on tectum as in Fig. 9B. Corniculi set straight, laciniae plumose up to end. Hypostome with $Q = 12$ (Fig. 9C). Seta G_1 smooth, setae G_2 , G_3 and G_4 serrate. On the internal side of the trochanter palpi (Fig. 9D) there is a thickened ridge, which ends above seta v_1 . Seta v_2 has a thick base and, unlike v_1 , it is not serrate. The digitus mobilis of the chelicera (Fig. 9E) bears irregular teeth and the digitus fixus has a big tooth at the end and small teeth with folded tops extending from this big tooth for two-fifths of the length of the internal edge. The synarthroidal membrane is rather sharply ended.

Lengths of legs: I — 970 μ , II — 715 μ , III — 570 μ , IV — 915 μ . Femur II: seta ad_2 with penicillate ending; spur triangle in outline. Genu (Fig. 9A): laminar apophysis on internal side, as in *P. brevicornis* BERL. The ventral

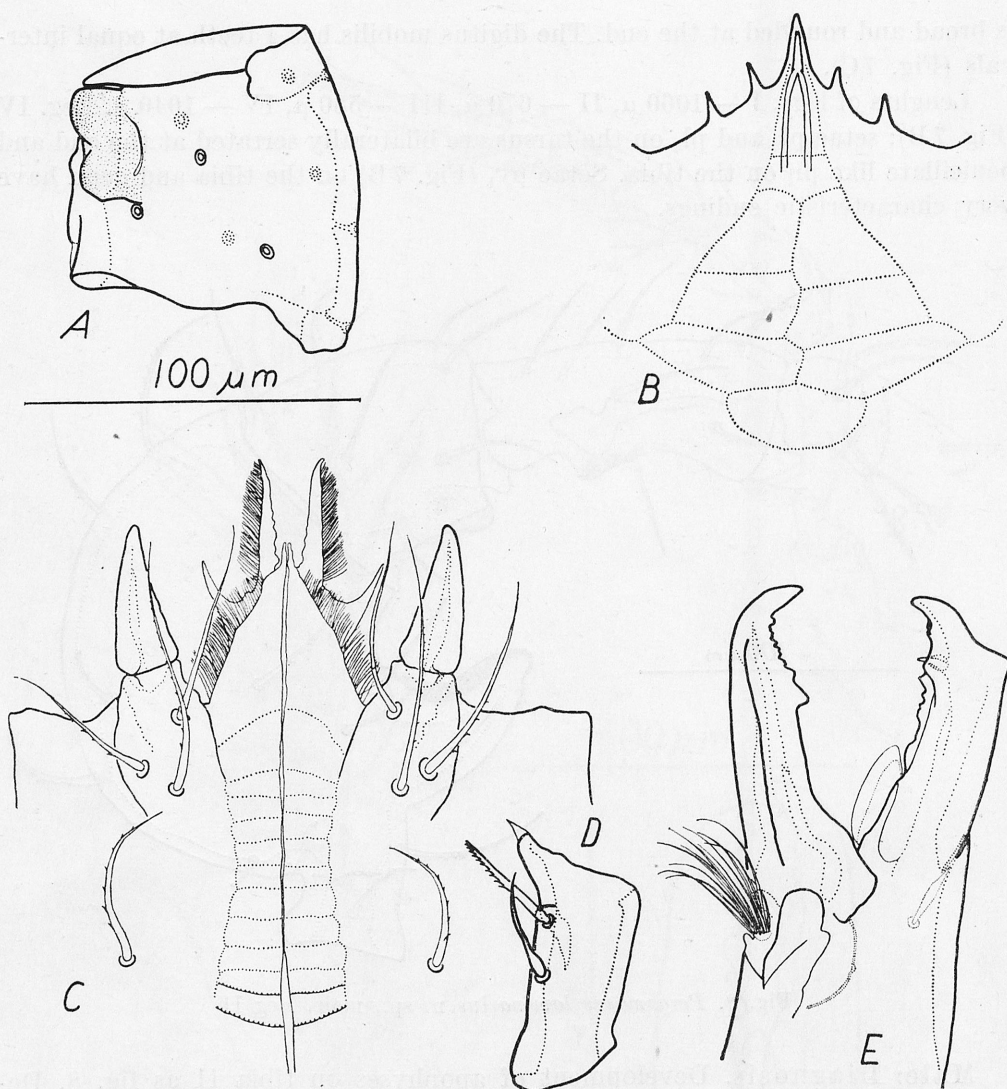


Fig. 9. *Pergamasus laminarius* n. sp., male. A — Ge II, B — tectum, C — gnathosoma, D — trochanter palpi, E — chelicera

apophysis on the tibia is developed similarly to that in *P. mediocris* BERL., but the anterolateral apophysis, parallel to it and arising at the height of seta al_1 , has a high eminence in its proximal portion (Fig. 8).

I wish to express my thanks to Dr. W. MICHERDZIŃSKI for initiating me in the subject of this study and valuable instructions during its accomplishment.

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STRESZCZENIE

W pierwszej części pracy wykazano odrębność gatunków *Pergamasus brevicornis* BERL. i *Pergamasus mediocris* BERL., często dawniej synonimizowanych. Zastosowano metodę hodowli zapłodnionych samic i po przeprowadzeniu pełnego cyklu rozwojowego otrzymano samce. Dzięki temu stwierdzono, że samicom *P. brevicornis* BERL. o endogynium jak na Fig. 2A odpowiadają samce mające nogę II jak na Fig. 4A. Natomiast do gatunku *P. mediocris* BERL. należą obok samce o endogynium jak na Fig. 2B — samce o nodze II jak na Fig. 4B, C.

Jedyną cechą gatunkową występującą u obu płci, którą udało się wykazać, jest kształt tarsus nogi IV. U *P. brevicornis* BERL. tarsus IV posiada w części środkowej zgrubienie, a w części końcowej zwęża się raptownie tworząc jakby czop (Fig. 3A, B). U *P. mediocris* BERL. tarsus IV jest smukły i zwęża się równomiernie ku końcowi (Fig. 3C, D).

W drugiej części autor opisuje samicę i samca nowego gatunku *Pergamasus laminarius*. Endogynium samicy jak na Fig. 6D. Noga II samca zgodnie z Fig. 8.

РЕЗЮМЕ

В первой части работы показана обособленность видов *Pergamasus brevicornis* BERL. и *Pergamasus mediocris* BERL., которые были часто представлены как синонимы. В работе применялся метод культивирования оплодотворённых самок, в ре-

зультате полново цикла развития были получены самцы. Благодаря этому констати-
ровано, что самки *P. brevicornis* BERL. с эндогениум как на рис. 2А соответствуют
самцы, II нога которых выглядит как на рис. 4А. К виду же *P. mediocris* BERL.
рядом с самками с эндогениум как на рис. 2В относятся также самцы с II ногой
как на рис. 4ВС. Единственным видовым признаком, наблюдаемым у обоих полов
и который удалось обнаружить является форма tarsus ноги IV. У *P. brevicornis*
BERL. на tarsus IV центральной части находится утолщение, которое внезапно сужи-
вается (рис. 3АВ). У *P. mediocris* BERL. tarsus IV узкий и ещё более суживается
по направлению к концу (рис. 3СД).

Во второй части автор описывает самок и самцов нового вида *Pergamasus*
laminarius. Эндогениум самки как на рис. 6D. Нога II самца как на рис. 8.

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