ANOPLODACTYLUS OPHIUROPHILUS N. SP., A SEA SPIDER ASSOCIATED WITH BRITTLE STARS IN THE SEYCHELLES

by

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ABSTRACT

A new species of Pycnogonida, Anoplodactylus ophiurophilus, is described. It is associated with three species of the genus Ophiocoma in the Seychelles (Indian Ocean) and constitutes the first recorded case of a sea spider found on Ophiuroida. In comparison with the 83 species actually recognized in Anoplodactylus, the new species shows hardly any morphological adaptations due to this remarkable association.

RÉSUMÉ

Une espèce nouvelle de Pycnogonides, Anoplodactylus ophiurophilus, est décrite. Elle est associée à trois espèces du genre Ophiocoma aux Seychelles (Océan Indien), le premier cas connu d’un Pycnogoneid rencontré sur des Ophiures. En comparaison avec les 83 espèces reconnues dans le genre Anoplodactylus, l’espèce nouvelle ne montre guère d’adaptations morphologiques relatives à cette association remarquable.

INTRODUCTION

To Dr. N. A. Sloan, Queen Mary College, University of London, I am indebted for entrusting me with a number of small pycnogonids found in remarkable abundance clinging to the ventral (oral) side of the arms of ophiuroids of the genus Ophiocoma in the Seychelles (Indian Ocean). Ophiocoma doederleini De Loriol, 1899, had the highest incidence of pycnogonid associates; lower infestation rates were found on O. erinaceus Müller & Troschel, 1842 and O. pica Müller & Troschel, 1842 (see Sloan, in preparation, for detailed data on infestation rates and the nature of the association). The pycnogonid proved to be a new species of the large genus Anoplodactylus which will be described in the sequel.

Anoplodactylus ophiurophilus n. sp.

(Figs. 1-9)


Description

Male: Trunk with indistinct segmentation lines on the dorsal surface, more distinct ones on the ventral side. Neck short, expanded in front of the first lateral processes. Lateral processes touching in their basal part, separated distally; distodorsally armed with two or three small spines. Ocular tubercle low, directed anteriad, rounded, eyes not visible at least in preserved material; lateral sense organs present as small processes on the lateral surface of the ocular tubercle, in subterminal position. Abdomen about as long as the fourth lateral processes, directed upward at an angle of some 35°. The entire trunk, including the ocular tubercle, the lateral processes and the abdomen, covered with a short pubescence.

Proboscis straight, almost cylindrical, slightly wider subterminally (type B” to D”, according to the classification of Fry & Hedgpeth, 1969: 20-21).

Chelifore scape pubescent, chela almost as long as scape. Palm with some spinules; immovable finger shorter than the palm, strongly curved, armed with two small denticles; movable finger longer than the palm, less curved, armed with a spine and some very small denticles.

No trace of palps. Oviger 6-segmented; relative lengths of the segments 14, 22, 25, 17, 16 and 6% (total: 100%). Reversed spines are numerous on segment 5. Segment 6 triangular, small. Eggs on oviger small (diameter 44-53 μm) and very numerous.

Like the trunk, the legs are covered with short setules. No genital spur. Sexual apertures found with certainty only on coxa 2 of leg 4. Femur with a single, short cement gland duct, just in
front of the middle of the segment, on its dorsal surface. Femur the longest, tibia 2 the shortest of the longer leg segments. Tarsus of normal shape (not wedge-shaped). Propodus with a very strong heel, armed with two heavy spines; sole with two basal and two distal spines, but without the usual row of regular spinules and without a lamina. Claw strong, curved, without any trace of auxiliary claws.

Female: Trunk more slender; lateral processes slightly more widely separated; segmentation lines more distinct, also on the dorsal surface of the trunk. Proboscis as in male, thus without ventral outgrowths. No palps, no ovigers. Sexual apertures on coxa 2 of all legs; no genital spur. Femur strongly swollen. Otherwise, the morphology is similar to that of the male.
Measurements of two paratypes, in mm

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<thead>
<tr>
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<th>δ</th>
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<tr>
<td>Length cephalic somite (from tip of ocular tubercle)</td>
<td>0.41</td>
<td>0.51</td>
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<tr>
<td>Length second trunk somite</td>
<td>0.12</td>
<td>0.16</td>
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<td>Length third trunk somite</td>
<td>0.11</td>
<td>0.17</td>
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<td>Length fourth trunk somite (to tip of fourth lateral processes)</td>
<td>0.23</td>
<td>0.24</td>
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<tr>
<td>Length abdomen</td>
<td>0.17</td>
<td>0.18</td>
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<tr>
<td>Width across second lateral processes</td>
<td>0.60</td>
<td>0.61</td>
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<tr>
<td>Length proboscis (ventral)</td>
<td>0.46</td>
<td>0.53</td>
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<tr>
<td>Greatest width proboscis</td>
<td>0.24</td>
<td>0.29</td>
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<tr>
<td>Third leg — coxa 1</td>
<td>0.16</td>
<td>0.19</td>
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<tr>
<td>coxa 2</td>
<td>0.23</td>
<td>0.22</td>
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<tr>
<td>coxa 3</td>
<td>0.17</td>
<td>0.24</td>
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<tr>
<td>femur</td>
<td>0.38</td>
<td>0.59</td>
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<tr>
<td>tibia 1</td>
<td>0.30</td>
<td>0.44</td>
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<tr>
<td>tibia 2</td>
<td>0.29</td>
<td>0.40</td>
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<tr>
<td>tarsus</td>
<td>0.06</td>
<td>0.11</td>
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<tr>
<td>propodus</td>
<td>0.28</td>
<td>0.36</td>
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<tr>
<td>claw</td>
<td>0.17</td>
<td>0.25</td>
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Distinction from other species

I recognize, at least provisionally, 83 valid species in the genus *Anoplodactylus*, which are listed in alphabetical sequence below. Also enumerated are the species required, as well as a number of taxa that are at present considered synonyms, homonyms or alternative spellings.

1. *aculeatus* Möbius, 1902
2. *anarthrus* Loman, 1908
3. *angulatus* (Dohrn, 1881) (ex *Phoxichilidium*)
4. *aragaoi* Sawaya, 1950
5. *arctatus* Child, 1977
8. *australis* (Hodgson, 1914) (ex *Phoxichilidium*)
10. *batangensis* (Helfer, 1938) (ex *Pycnosoma*)
11. *brasilienis* Hedgpeth, 1948 (pro *A. pygmaeus* Marcus, 1940, non Hodge, 1864)
12. *brevicollis* Loman, 1908
13. *californicus* Hall, 1912
14. *capensis* (Flynn, 1928) (ex *Phoxichilidium*)
15. *compactus* Hilton, 1939
17. *crickellatus* Calman, 1923
18. n. sp. Stock, in press (pro *A. virescens* Arnaud, 1974, non Hodge, 1864)
19. *derjugini* Losina-Losinsky, 1929
20. *digitatus* (Böhm, 1879) (ex *Phoxichilidium*)
21. *erectus* Cole, 1904
22. *eroticus* Stock, 1968
23. *evansi* Clark, 1963
24. *evelinae* Marcus, 1940
25. *gestiens* (Ortmann, 1890) (ex *Phoxichilidium*)
27. *guayanensis* Child, 1977
28. *haswelli* (Flynn, 1918) (ex *Halosoma*)
29. *bokkaidoenis* (Utinomi, 1954) (ex *Phoxichilidium*)
30. *inermis* Losina-Losinsky, 1961
31. *insigniformis* Stock, 1975
32. *insignis* (Hoek, 1881) (ex *Phoxichilidium*)
33. *juleus* Stock, 1975
34. *jonesi* Child, 1974
35. *jungerisi* Fage, 1949
36. *laminifer* Arnaud, 1974
37. *lentus* Wilson, 1878
38. *longiceps* Stock, 1951 (pro *A. longicollis* Williams, 1941, preoccupied)
39. *longiformis* Child, 1977
40. *mamillosum* Stock, 1954
41. *marcusi* (de Mello-Leitão, 1949) (ex *Halosoma*)
42. *maritimus* Hodgson, 1914
43. *massilemi* Bouvier, 1916
44. *massiliformis* Stock, 1975
45. *micros* Bourdillon, 1955
46. *miniscus* Clark, 1970
47. *minutissimus* Stock, 1954
49. *multiclavus* Child, 1977
50. *neglectus* Hoek, 1898
51. *nodosus* Hilton, 1939
52. *oculatus* Carpenter, 1905
53. *oculospinus* Hilton, 1942
54. *pacificus* Hilton, 1942
55. *peclinus* Hedgpeth, 1948
56. *pelagicus* Flynn, 1928
57. *petiolatus* (Krøyer, 1844) (ex *Phoxichilidium*)
58. *phorus* Stock, 1975
59. *polignaci* Bouvier, 1914
60. *portus* Calman, 1927
61. *palcher* Carpenter, 1907
62. *pycnosoma* (Helfer, 1938) (ex *Peritrachia*)
63. *pygmaeus* (Hodge, 1864) (ex *Pallene*)
64. *quadrispinosus* Hedgpeth, 1943
65. *robustus* (Dohrn, 1881) (ex *Phoxichilidium*)
66. *simplex* Clark, 1963
67. *simulator* Stock, 1975
68. *spinosus* (Losina-Losinsky, 1961) (ex *Phoxichilidium*)
69. *squallidus* Clark, 1973
70. *stictus* Sawaya, 1945
71. *stocki* Bácescu, 1959
72. *tarsalis* Stock, 1968
73. *toros* Child & Hedgpeth, 1971
74. *tripinosus* Stock, 1951
75. *tubiferus* (Haswell, 1884) (ex *Phoxichilidium*)
76. *turbitus* Stock, 1975
77. *typhlops* Sars, 1888
78. *unilobus* Stock, 1959
79. *unocularis* Hilton, 1942
80. *versluyi* Loman, 1908
81. *virecens* (Hodge, 1864) (ex *Phoxichilidium*)
82. *virdigestinalis* (Cole, 1904) (ex *Halosoma*)
83. *xenus* nom. nov. (pro *A. baswelli* Stock, 1954, non Flynn, 1918, see Clark, 1963: 49)

Species inquirenda, homonyms, synonyms, alternative names:

- *angulirostris* (Dohrn, 1881: 34, 35, 68), nom. alt. pro *A. angulatus* (Dohrn, 1881).
- *carausboi* Marcus, 1940, jun. syn. of *A. portus* Calman, 1927.
exiguus (Dohrn, 1881) (ex Phoxichilidium), jun. syn. of A. pygmaeus (Hodge, 1864).


insignis bermudensis Cole, 1904 (identical with insignis s. str.).

intermedia Hilton, 1942, jun. syn. of A. batangensis (Helfer, 1938).

investigatori Calman, 1923, jun. syn. of A. digitatus (Böhm, 1879).

lappa (Böhm, 1879) (ex Pallene), species inquirenda.

longicollis (Dohrn, 1881), jun. syn. of A. petiolatus (Kroyer, 1844).

longicollis Williams, 1941, homonym of longicollis (Dohrn, 1881); now: A. longiceps Stock, 1951.

longrostris (Dohrn, 1881: 34), nom. alt. pro longicollis (Dohrn, 1881).


mutatus (Frey & Leuckart, 1847) (ex Phoxichilidium), species inquirenda.

parvus Giltay, 1934, jun. syn. of A. maritimus Hodgson, 1914.


plumulariae (Von Lendenfeld, 1883) (ex Phoxichilidium), species inquirenda.


robustus Hilton, 1939, homonym of A. robustus (Dohrn, 1881); jun. syn. of A. portus Calman, 1927.

robustus Zilberberg, 1963 (non Dohrn, 1881); cf. A. marcus (de Mello-Leitão, 1949).

saxatilis Calman, 1923, jun. syn. of A. digitatus (Böhm, 1879).

spinosus Möbius, 1902; transferred to Parapallene.

stylorostris Hedgpeth, 1948, jun. syn. of A. batangensis (Helfer, 1938).

stylps Loman, 1908, jun. syn. of A. pulcher Carpenter, 1907.

teiururostris Lebour, 1948, jun. syn. of A. batangensis (Helfer, 1938).

Of the 83 species enumerated above, the following 14 differ from A. ophiurophilus n. sp. in having the femoral cement glands (>V) discharging through more than one aperture on each leg: angulatus, australis, cribellatus, "n. sp. no. 18", glandulifer, hokkaidoensis, longiceps, longiformis, multiclavus, oculatus, pycnosoma, robustus, virescens and xenus (the condition of the cement gland is unknown for 15 species, e.g. because the male of those species is unknown).

Another 9 species have a single cribiform or pore-like cement gland aperture (V), at any rate not a duct-like one as in the new species described above: compactus, evelinae, insignis, lentus, massiliensis, "n. sp. no. 48", pectinus, polignaci, viridintestinalis (here again, the condition of the cement gland aperture is unknown in the same 15 species as in the preceding paragraph).

The 37 species listed below differ from A. ophiurophilus n. sp. in possessing a distinct propodal lamina (V, V): aragaoi, arcurus, arescus, arnauae, bahamensis, brasiliensis, compactus, cribellatus, digitatus, erectus, gestiens, glandulifer, guayanensis, iuleus, jonesi, jungersi, laminifer, longiformis, mamillosus, marinus, micros, minutissimus, multiclavus, nodosus, oculosinus, pacificus, petiolatus, pharus, pygaeus, stictus, stocki, tarsalis, toros, trispinosus, turbidus, viridintestinalis (the condition of the propodal armature is unknown for one species).

One species, batangensis, has a styliform proposisc (V, V) of a shape quite unlike that of the present new species (the shape of the proposisc is known for all 83 species listed above).

The following 11 species are known to possess ventral outgrowths on the V proposisc, whereas the presently described species is devoid of such outgrowths: arnauae, brevicollis, digitatus, evansi, insignis, jungersi, polignaci, portus, stictus, unilobus, versutus (the condition of the V proposisc is unknown for 19 species, e.g. because the female sex is unknown).

Most species of the genus, viz. 75, possess rudimentary auxiliary claws. Only eight species are devoid of auxiliaries, a condition shared by A. ophiurophilus n. sp. These eight species are: aculeatus, anarthus, arescus, batangensis, pectinus, pygaeus, stictus, and tarsalis.

The above comparisons show that only two species of Anoplodactylus share the six character states used in the preceding lines with A. ophiurophilus n. sp., viz. A. aculeatus and A. anarthus. The former of these two, aculeatus, does not resemble in the least the new species, since it possesses long spurs on the coxae, femur and first tibia, has chelae with closing (as opposed to gaping) fingers, and carries a regular row of spinules on the propodal sole (in fact, A. aculeatus is very close to, if not identical with, A. insignis). The second of the two species, anarthus, is more similar to A. ophiurophilus n. sp., but possesses a row of six regular spinules of a size on the pro-
podal sole, and has touching (as opposed to separated) lateral processes.

It is clear, therefore, that the material from the Seychelles represents an undescribed species, which I propose to call *A. ophiurophilus* in virtue of its unique association with ophiurans of the genus *Ophiocoma*. It is remarkable, though, that the pycnogonid has developed so few morphological adaptations to its peculiar mode of life. As point of fact, the new species could almost be considered a generalized *Anoplodactylus* without any striking characters. The only, however slight, adaptation might be found in the morphology of the pro-podus, which is strongly curved, lacking the usual row of sole spines, and forming with the opposing claw a strongly prehensile device.

Up to now not a single pycnogonid was known to be associated with ophiuroids, although other echinoderm groups are reported as possible food source (Holothuroidea, Echinoidea; refs. in Stock, 1978). Members of the genus *Anoplodactylus* have been recorded mainly from different groups of hydroids (refs. in King, 1973, tables III & IV) and medusae, but the closely related genus *Pycnosoma* was recorded from the echinoderm *Strongylocentrotus*, a sea urchin, by Losina-Losinsky, 1933.

*Anoplodactylus* is predominantly a warm-water genus, with only few representatives in temperate (e.g. *A. petiolatus*), cool (e.g. *A. laminifer*) or polar (e.g. *A. australis*) waters. Several representatives of the genus have been found, however, in cooler deep waters (e.g. *A. arnauae*, *A. oculatus*). There is no doubt that the genus reaches its greatest proliferation in the tropics of both the Indo-Pacific and the Caribbean.

REFERENCES

(A complete bibliography of the Pycnogonida can be found in Fry & Stock, 1978).


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