Anoplodactylus aragãoi, n. sp. and other collected by the hydrographic research-ship "Rio Branco"

by

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In May 1948, the Oswaldo Cruz Institute sponsored an exploration cruise along the Brazilian coast line, starting in Rio de Janeiro and ending with the town of Victoria (State of Espirito Santo). Out of the vast material collected and selected during the trip, I was able to deal with a portion of the Pantopodes, to which this publication is devoted. Besides a new species, all the others will be found in the survey published by Marcus in 1940.

I have much pleasure to be able to commemorate my gratitude to the Oswaldo Cruz Institute in the person of its distinguished ex-director, Dr. Henrique de Beaupaire Aragão, in dedicating to him the new species described, obliging by this very kind invitation extended to this Department, this Faculty and University, to participate in the cruise. Equally thanks are due to Prof. Pierre Drach, whose expert advice made the excursion a plain success, as also to all other participants of the expedition, including the boat’s crew, whose help had made the gathering of the scientific material possible. I am also indebted to Prof. Dr. Ernesto Marcus for bibliographic advice, and for revising this manuscript.

Anoplodactylus aragãoi, n. sp.

Material: one male (type), and one female (paratype), collected amongst Hydrozoa, Bryzoa, and algae, dredged in 35 ms depth at the coast of Espirito Santo, Lat. 20°33’ S. and Long. 40°14’ While alive the animals showed greenish colour. Placed in alcohol, this colour disappeared except in parts of the intestines. The cuticle lost its colour and becomes almost translucent.

Description of the male: body elongated and slender; well pronounced separation of three anterior segments, third and fourth segment fused together; the three anterior pairs of lateral processes are of a length equal to
the width of the trunk, the last pair is shorter; lateral processes are all of equal width, but not equidistant. The distance between the first and second pair is distinctly greater the distance than between the second and third, while the distance between the second and third is only slightly greater than the distance between the third and fourth. The distal edge of the dorsal surface of each of the processes bears clearly distinguishable spine, surrounded in the case of the first, second and third pair of processes by two smaller spines. Ocular tubercle high and thick, approximately conical, anterior edge slightly curved (see illustration). Eyes well pigmented, sharply defined, and of elliptic shape, situated sub apice.

Strong abdomen of cylindric shape and slightly higher than the ocular tubercle, directed obliquely backwards, in symmetrical position to ocular tubercle, which is directed obliquely forwards.

Chelophores well developed extending beyond the distal border of the proboscis. Scape much longer than wide, slightly swollen at the joint of Chela. Palm of equal thickness of extremity of scape; fingers curved, medium strong.

Strong proboscis of thickness equal to trunk, cylindric, with round distal end, slightly curved at one third’s distance from end; directed obliquely downwards.

Ovigers consisting of 6 segments, the first being the widest, and the third the longest; long setae abound in the fifth and sixth segment. Palps only in reduced cylindrical form to the left side of “cephalon”.

Ambulatory legs of medium size, measuring three times the length of the trunk. First and third coxae of approximately equal size. Two spines on distal borders of both, laterally and symmetrically situated. The longest of the coxae is the second, not quite as long as first and third together; genital tubercle conical in shape, medium-sized. Femur strongest of all segments, with sharp distal projection, occurring in all legs. Near middle of dorsal margin (proximally situated rather than distally) there are the openings of cement glands, ending with long and thin ducts. First tibia shorter than femur, and slightly longer than second tibia. Its dorso-distal margin wears long bristle of a length almost equal to that worn by femur.

The longest of the bristles is situated at the dorsal margin of the second tibia, near its distal end. Tarsus small and of trapezoide shape. Distally the tarsus ends with strong spine. Propodus curved, medium strong; at its base there is a conical spine, followed by two pairs of equally sharp-ones.
but rising from narrower bases; these are followed in the direction of the sole by two smaller spines. There are 9 strong square-like spines (or teeth) along the median of the propodus' sole. Small knife-like edge distally situated and a terminal spine obliquely directed for ward. In equal distance and on both sides of the median, two each consisting of 5 sharp spines are discernible if looking through magnifying lenses. The terminal claw is long and strong. Folded its end reaches the spines of the heel. Theres are no accessory claws, or are so little developed they can hardly be recognized.

**Female:**

The female represents the same general characteristics as the male. But the specimen found is of stronger stature. This was possible due to differences in maturation. It is possible that the male found was not yet sexually mature, as no eggs were deposited on the ovigers, when captured. The proboscis of the female is slightly larger than that of the male; on the heel of the propodus there are but two pairs of spines, besides the isolated spine, which is stronger as already described above (see male specimen). But a significant difference between the two sexes resides in their different segmentation of the trunk. As described above, the male trunk shows no intersegmental line between the third and fourth segment; the female shows this inter-segmental line, although less clearly than the preceding lines.

**Measurements of male and female respectively gave (in 0.001 mm):**

- Total length, from proboscis to end of abdomen: 1,200; 1,450
- Cephalic segment (Cephalon), length: 470; 500
- Distance from the left to the right antero-distal border of the first lateral processes: 715; 500
- Width of trunk (at the height of the joint between the first and second segments): 250; 260

<table>
<thead>
<tr>
<th>Proboscis, length:</th>
<th>630, 670</th>
<th>width:</th>
<th>220, 260</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheliphore scape, length:</td>
<td>325, 440</td>
<td>width:</td>
<td>95, 105</td>
</tr>
<tr>
<td>Chela: length:</td>
<td>180, 200</td>
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</tbody>
</table>

**Oviger (of male):**

<table>
<thead>
<tr>
<th>First segment:</th>
<th>length:</th>
<th>145:</th>
<th>width:</th>
<th>145</th>
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<tr>
<td>Second &quot;</td>
<td></td>
<td>290;</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>Third &quot;</td>
<td></td>
<td>390;</td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>Fourth &quot;</td>
<td></td>
<td>175;</td>
<td></td>
<td>60</td>
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<tr>
<td>Fifth &quot;</td>
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<td>125;</td>
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<td>50</td>
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<tr>
<td>Sixth &quot;</td>
<td></td>
<td>80;</td>
<td></td>
<td>35</td>
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Third ambulatory leg:

<table>
<thead>
<tr>
<th></th>
<th>length</th>
<th>maximum width</th>
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</thead>
<tbody>
<tr>
<td>First coxa</td>
<td>200, 230;</td>
<td>180, 210</td>
</tr>
<tr>
<td>Second &quot;</td>
<td>355, 360;</td>
<td>180, 250</td>
</tr>
<tr>
<td>Third &quot;</td>
<td>210, 280;</td>
<td>170, 240</td>
</tr>
<tr>
<td>Femur &quot;</td>
<td>650, 780;</td>
<td>195, 300</td>
</tr>
<tr>
<td>First tibia</td>
<td>570, 720;</td>
<td>155, 210</td>
</tr>
<tr>
<td>Second tibia</td>
<td>530, 640;</td>
<td>120, 170</td>
</tr>
<tr>
<td>Tarsus</td>
<td>length</td>
<td></td>
</tr>
<tr>
<td>Propodus</td>
<td>410, 470;</td>
<td>130, 165</td>
</tr>
<tr>
<td>Terminal claw</td>
<td>length</td>
<td></td>
</tr>
</tbody>
</table>

Remarks: Although there are specimens of both sexes at hand, it is difficult to decide whether they represent a new species of the genus *Anoplodactylus*, for reasons pointed out by HEDGEPETH (1948, p 221). This genus comprises to-day probably 45 species, partly insufficiently described, due to incomplete diagnoses or failing illustrations. Besides that, the genus is often confounded with *Phoxichilidium* or with *Halosoma*; diagnoses are often very inaccurate, and very often common characteristics of the genus are mistaken for characteristic of a particular species.

The classification of the present species as part of the genus *Anoplodactylus* follows strictly the most recently explained criteria (MARCUS 1940, HEDGEPETH 1948), i.e., the long neck in the first segment (as opposed to *Phoxichilidium*), and a generally slender trunk (as opposed to *Halosoma*).

The species in front of us differs from all the others by the properties of the propodus combined with the shape the duct of the cement gland. By its propodus it resembles those which can be characterized by the presence of a knife-like edge, although in our case it is a a small-one, possibly like that of *A. cribellatus* (CALMAN 1923, p. 286, fig. 12 d). But the square-like shape of the teeth of the sole is a sufficient criterion of distinction from all the other species with knife-like edges, like: *A. brasiliensis*, *A. cribellatus*, *A. erectus*, *A. nodosus*, *A. oculosinus*, *A. pacificus*, *A. parvus*, *A. petiolatus*, *A. pugmaeus*, *A. stictus*. The key annexed emphasizes the characteristic differences of these species.

The square-like shape of the teeth of the propodus is no peculiarity of *A. aragaoi*; HEDGEPETH (1943) described *A. quadratispinosus*, underlining the occurrence of this very same characteristic. There is also the species *A. digitatus* (BÖHM), whose picture shows teeth of a doubtless similar form (LOMAH 1908, t. II, Fig. 25). But *A. aragaoi* is not to be mistaken for any of these.
Key to the species Anoplodactylus

The lack of a key for the distinction of the species of *Anoplodactylus* made the comparison of these species, and the classification of the specimens at hand difficult, so that an attempt at systematization of the species of the genus described in the literature available to the author, had to be made.

1 Proboscis conical, styliform ........................................ 2
   — Proboscis not styliform, usually cylindrical .................. 3
2 Eyes sharply defined .......... *stylirostris* Hedgpeth (1948, p. 232)
   — No eyes, or little distinctive eyes .......... *intermedius* Hilton (1942, p. 73)
3 Second tibia not essentially shorter than the first, and more or less equal to, or greater than propodus ................................ 4
   — Second tibia shorter than half the first, and considerably shorter than propodus .......... *evelinae* Marcus (1940, p. 55).
4 Ocular tubercle short, roundish ..................................... 5
   — Ocular tubercle long, cylindrical or conical, eyes clearly distinguishable (although sometimes little pigmentedated) .................... 8
5 Ocular tubercle almost imperceptible, eyes absent ................. *typhlops* Sars (1891, p. 29) = *? neglectus* Hoek (1898, p. 203)
   — Eyes present, fingers of Chelae thin and slender ............... 6
   — Abdomen erected ......................................................................... 7
7 Abdomen short, second coxa not quite as long as first and third together; heel of propodus with 3, sometimes 2, strong spines ...... .... *maritimus* Hodgson (1914, p. 164; 1915, p. 148; 127, p. 357)
   — Abdomen long, second coxa longer than the two others together; heel of propodus with 2 strong spines; duct of sement gland neither very long nor very short .......... *? pelagicus* Flynn (1928, p. 25)
8 Propodus having on sole knife-like edge (though sometimes short) 9
   — Propodus without knife-like edge ........................................ 18
9 Ocular tubercle having terminal and lateral spine ................. ................. *? oculospinus* Hilton (1942, p. 72); *? pacificus* (p. 73)
   — Ocular tubercle devoid of terminal or lateral spines .............. 10
10 Lateral processes with knobs, tubercles or spines on dorso-distal edge (sometimes not fully developed) ......................... 11
Lateral processes on dorso-distal edge smooth

11 Ambulatory legs short, having knob-like tubercles chiefly on femur and tibias; sole of propodus with approximately 13 spines in front of knife-like edge \nodosus\ Hilton (1939, p. 29; 1942, p. 72)

Ambulatory legs at least twice as long as trunk, without any knob-like tubercles

12 Sole of propodus with 1-2 spines in front of elongated knife-like edge; tubercles of lateral processes with one terminal spine \pygmaeus\ Hodge (1864, p. 116)

Sole of propodus with 4 to 11 spines or teeth in front of knife-like edge spines simple, or tubercles without terminal spines on lateral processes

13 Propodus with 4-6 teeth in front of knife-like edge; abdomen slightly rising upwards; fixed finger of chela more or less straight

Propodus with 6 or more teeth in front of knife-like edge; abdomen erected; both fingers of chela curved

14 Tubercles of lateral processes conspicuous in size; tibiae with many setae; cement gland situated in distal part of femur \petiolatus\ Kröyer 1844, p. 123)

Tubercles of lateral processes inconspicuous; only few setae on tibiae; cement gland situated approximately in the middle of dorsal edge of femur \parvus\ Giltay (1934, p. 1)

15 Cement gland with thick duct; proboscis of female with heart-shaped produberances ventrally \stictus\ Marcus (1940, p. 65 = \jungeri\ Fage (1949, p. 25)

Cement gland with thin duct; proboscis of female devoid of produberances

16 Propodus not strongly curved; sole with 7-11 sharp spines and knife-like edge well developed; third segment of oviger thinner than second, and longer than first and second together \erectus\ Cole (1904, p. 289)

Propodus strongly curved, sole with 9 square-like teeth in front of inconspicuous knife-like edge; third segment of oviger as thick as second and only slightly greater than second \aragaoi\ n. sp.

17 Cheliphore scape long and thin, considerably longer than chela; 8 or 9 spines in front of small knife-like edge; numerous (possibly 15)
<table>
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<tr>
<th>Page</th>
<th>Text</th>
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<tbody>
<tr>
<td>18</td>
<td>Propodus with long ventrally situated spine. unospinus Hilton (1942, not 1939, p. 73).</td>
</tr>
<tr>
<td>19</td>
<td>Propodus with numerous ventral spines.</td>
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<tr>
<td>20</td>
<td>Spines of heel of propodus simples.</td>
</tr>
<tr>
<td></td>
<td>One of the spines of the heel, com-blade. pectinus Hedgpeth (1948, p. 234).</td>
</tr>
<tr>
<td>21</td>
<td>Proboscis of rectangular or parabolic shape.</td>
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<tr>
<td></td>
<td>Proboscis approximately cylindrical.</td>
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<tr>
<td>22</td>
<td>With knob-like basal projection on terminal claw. angulatus (Dohrn 1881, p. 184).</td>
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<tr>
<td></td>
<td>Without knob-like basal projection on terminal claw. plumulariae (Lendenfeld, 1883, p. 323).</td>
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<tr>
<td>23</td>
<td>Oviger 6 — segmented.</td>
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<td></td>
<td>Oviger 9 — segmented. spinosus Möbius (1902, p. 188).</td>
</tr>
<tr>
<td>24</td>
<td>Lateral processes without knobs, tubercles, semi-circular knobs; pro boscis of female with protuberances ventrally situated.</td>
</tr>
<tr>
<td></td>
<td>Lateral processes with out knobs, tubercles, semi-circular knobs but having spines or a smooth surface.</td>
</tr>
<tr>
<td>25</td>
<td>Segmentation of trunk complete; all intersegmental lines well visible.</td>
</tr>
<tr>
<td></td>
<td>Segmentation of trunk incomplete; no intersegmental line between third and fourth segments; propodus with 7-11 spines on sole. carvalhoi Marcus (1940, p. 60).</td>
</tr>
<tr>
<td>26</td>
<td>Propodus with 4 or 5 spines on sole; female with vestigial ovigers. robustus Hilton (1938, p. 28).</td>
</tr>
<tr>
<td></td>
<td>Propodus with many (7 to 11 ?) spines on sole; both sexes with vestigial palps; male with genital openings on all legs. portus Calman (1927, p. 405).</td>
</tr>
<tr>
<td>28</td>
<td>Lateral processes with long spines, ocular tubercle and abdomen very long; duct of cement glands conspicuous in length.</td>
</tr>
</tbody>
</table>
Abdomen erected ............... *pulcher* Carpenter (1907, p. 97)
— Abdomen in horizontal position .... *stylors* Loman (1908, p. 71)

Body compact; lateral processes very little distant from each other, in contact with each other at their bases ....................
— *californicus* Hall (1913, p. 129; Hedgpeth 1941, p. 257)
— Body not compact, usually slender; lateral processes distant from each other, their distance being greater than their own diameter ..

Segmentation of trunk little pronounced or fusion of last two segments ..................................................
— Segmentation of trunk always well pronounced (only last intersegmental line sometimes weak) ...........................................

Dorsal spines existing situated at the height of second and third lateral processes ........... *tubiferus* (Haswell 1884, p. 1.032)
— Dorsal spines absent ..................................................................

Sole of propodus having many square-like spines ................
— *quadratispinosus* Hedgpeth (1943, p. 47; 1948, p. 232)
— No square-like spines on sole; notches or projections on trunk and legs ............................ *projectus* Hilton (1942, p. 73)

Legs fairly long; second tibia longer (if only by little) than first ..
— Legs of not very conspicuous length; second tibia never exceeding the first ..........................................

Cheliphore scape conically swollen at distal extremity; lateral processes as long as they are wide ..................
— Cheliphore scape without conical swelling; lateral processes of greater length than width ...........................................

Conical swelling situated on propodus; cement gland of cribriform type; legs about 3 times longer than trunk; spines of heel all of equal shape, proboscis of female sometimes with protuberances ventrally ................ *insignis* (Hoek 1881, p. 82)
— Propodus without conical swelling distally situated; length of legs about 6 times that of trunk .... *aculeatus* Möbius (1902, p. 188)

Distance between lateral processes considerably greater than their diameters; propodus with conical swelling distally situated; length of legs approximately 6 times that of the body .....................
— *massiliensis* Bouvier (1916, p. 14; 1923, p. 40)
— Distance between lateral processes approximately equal to their own diameter; propodus without conical swelling distally situated .......... 36

36 Proboscis with protuberances ventrally situated, or proboscis with greater diameter than trunk ................................................. 37

— Proboscis without protuberances ventrally situated and not of greater diameter than trunk ................................................. 39

37 Female (male specimen unknown) with 4 protuberances on proboscis, ventrally situated ...... investigatoris Calman (1923, p. 288)

— Proboscis of greater diameter than trunk ................................................. 38

38 Abdomen conical, sole entirely covered with large, flat, square-like teeth; accessory claws absent; second tibia with few setae ................. 40
digitatus Böhm (Loman 1908, p. 74)

— Abdomen oval; sole lengthwise with one row of (6?) sharp spines, with thin setae in between; second tibia with many setae of uniform shape .......................... brevicollis Loman (1908, p. 74)

39 Ocular tubercle long, sharply conical, abdomen long and also conical, but with rounded end ................................................. 40

— Ocular tubercle not sharply conical, of medium length, lateral processes of approximately twice as long as the trunk wide; propodus without pronounced heel, with many very thin spines on sole........... 40
gestiens (Ortmann 1890, p. 166)

40 Second coxae vary in length in different legs, the second coxa of the fourth pair of legs being longest, duct of cement gland short and wide .......................... versluysi Loman (1908, p. 73)

— All second coxae approximately equal in length in all legs, cement gland of cribriform type ................................................. 41

41 A few (about 5) cement glands in every femur; oviger with terminal claw ................................................. 42

.. oculatus Carpenter (Calman 1923, p. 287; Williams 1941, p. 38)

— One or two cement glands on every femur; oviger without terminal claw ................................................. 42

42 Propodus with one strongly developed spine on heel, surrounded by many other smaller-ones; 2 cement gland openings on every femur; length of third segment of ovigers approximately equal to that of the first and second together ...... longicollis Williams (1941, p. 36)
Propodus with equally developed spines on heel; only one cement gland opening on every femur; length of third segment of ovigers exceeds considerably that of first and second combined ............

............ polignaci Bouvier (1914, p. 224; Hedgpath 1948, p. 230)

Note: Amongst the species considered doubtful there is in this key A. pacificus Hilton. In the case of this species a printing error must have occurred. The description by the same author (Hilton 1942) seems to have been confused with Anoplodactylus oculospinus. Otherwise the divergence between the specific characters of the animal and its name could not be understood. For being considered doubtful new species in the eyes of their own authors (Calman, 1923, p. 289; Hedgpath 1948, p. 236-37), there were also not included the specimens not denominated by them as such.

Besides the new species described, there were collected on the same occasion together with it Anoplodactylus carvalhoi, A. evelinae, A. petiolatus, Tanystylum isabellae, Tanystylum orbiculare. Without opposing the opinion of Giltay (according to Hedgpath 1948, p. 232) who proposed in an not yet published essay the adoption of a new genus for A. evelinae, I believe the classification of Marcus, to be more accurate. Besides the fully justified remarks of Marcus concerning the few disjunctive characteristics between the genus of the family Phoxichilidiidae, the creation of the new genus of this family seems to be difficult in view of the variability of characteristics of species doubtless belonging to Anoplodactylus. Thus in consideration of their general shape as to be seen in the illustrations of Hedgpath (1948, fig. 31 a, fig. 33 a) the separation of A. evelinae and A. stylirostris is possibly difficult. In view of the length of the second tibia, A. evelinae is doubtless singular in its genus; it may be possible to establish a missing link of this species with all the others of that genus, possibly in A. stylirostris, the second tibia of which is shorter than the propodus (Hedgpath, 1. c., figure 33 d).