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O trzech gatunkach rodzaju *Acherontides* BON. (*Collembola*) z jaskiń Afganistanu i pokrewieństwie tego rodzaju z innymi rodzajami

О трех видах рода *Acherontides* BON. (*Collembola*) из пещер Афганистана и о родстве этого рода с другими близкими родами.

On the three species of the genus *Acherontides* BON. (*Collembola*) from the Afghanistan caves and the relationship of this genus with some other similar genera

(With 3 plates in text)

In August 1958 I received from Dr. K. LINDBERG (Lund, Sweden) the materials of *Collembola* caught by him in Afghanistan, at most part in the caves of this country, with the proposal to determine of them. As Dr. LINDBERG wanted to represent the results of his studies in Afghanistan already in October on the II International Speleological Congress in Bari (Italy) I examined the cavernicolous specimens at once, found among them two already known and 14 new species, shortly diagnosed all them provisionally, and sent the results of this examination in September 1958 to Dr. LINDBERG in the form of a note „*Collembola* of the Afghanistan caves collected by Dr. K. LINDBERG“.

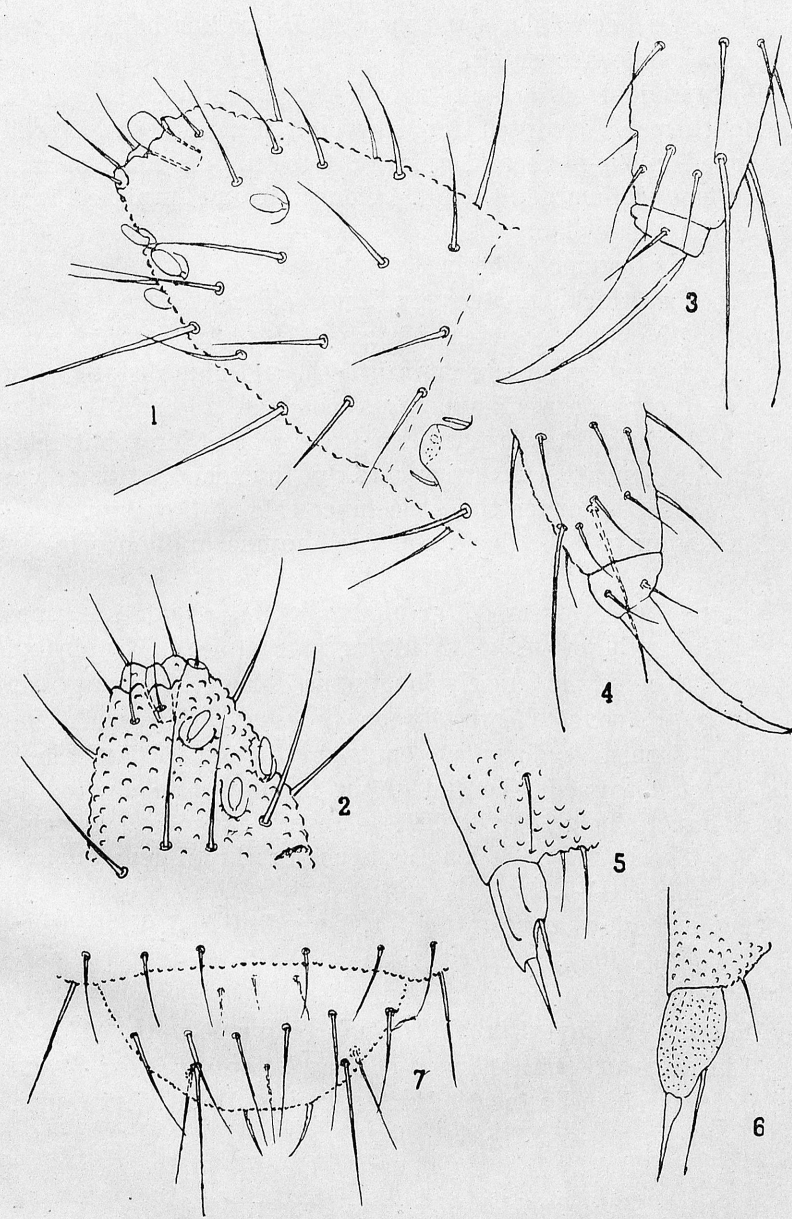
Among the new species there are some very interesting ones on account of their position in the system and zoogeographically. To such species there belong first of all the representatives of the genus *Acherontides* BONET. I describe — here more exactly three species of this genus, and add some remarks over the affinity of the genus *Acherontides* BON. with the other similar genera.

Acherontides aspinatus STACH, 1958 *

Length 0,8—1 mm. Colour white. Body clothed dorsally with moderate long, curved setae indistinctly serrated on their frontal side, and some stiff longer, smooth bristles arranged laterally on the segments. The curved setae are on the thoracic segments about $\frac{2}{3}$ as long as the claw, further they become gradually a little longer, and on the Abd. V and VI are as long as the claw. The stiff bristles are longer than the claw (in a ratio of 4:3). On Thor. I there are dorsally only 4 setae; on the other segments the setae are arranged in two transversal rows. Skin covered with pretty large, conical granules.

The antennae about $\frac{2}{3}$ as long as the diameter of the head. The relative lengths of the joints are as 1,5:1,5:1,8:2,2. The third joint is not very distinctly separated from the fourth one. The first and second joint is furnished with one row of setae only. Sensory organ of third antennal joint consists of a high semilunar fold, behind that are placed two minute globular sensory rods; laterally at the basis of the fold a short, fine olfactory hair is inserted on each side. The typical thick olfactory hairs are wanting on the fourth joint; on their place there appear subapically on each antenna four oval vesicle-like sensillae, three of which are arranged in a triangle on the outer side of the joint laterally, and one on the inner side. At the tip of the joint a single retractile sensory papilla is

* As the results of the works of the II International Speleological Congress are up to day not published, the species of the genus *Acherontides* BON. described here may be considered as new the literature.



Pl. I. — *Acherontides aspinatus* STACH. — 1. Ventral side of the Ant. III and IV; 2. Dorsal side of the apical part of Ant. IV of an other specimen; 3. outer side of the distal part of third leg; 4. Inner side of the distal part of the foreleg of an other specimen; 5. Ventral side of the furcula; 6. Outer side of the furcula of an other specimen; 7. Dorsal side of the Abd. VI.

situated in a deep hollow and near to it is a fine hair inserted in a crater-like deepening.

Postantennal organ and the eyes are wanting.

Mouth parts adapted for chewing. Mandibles have well developed molar-plate and apically 4 teeth. The head of maxilla is not globular, but a little elongated and furnished with two distinct lamellae.

All body segments distinctly separated.

The legs thick, moderately long, clothed sparsely with smooth setae. Claw slender, furnished laterally near to basis with a pair of very minute lateral teeth, and high distally with a small inner tooth. Empodial appendage absent. Dorsally near the basis of the claw is arranged a pair of long, but relatively fine tenent hairs very weakly thickened at the tip; they are a little longer than the inner side of the claw.

Tenaculum with 3 barbs on each ramus and no seta on corpus.

Furcula well developed in all its joints, about 1,5 times longer than tibiotarsus of the third pair of legs. Manubrium broad with some moderately long setae dorsally. Dens swollen at the basis, covered laterally on the outer side with fine granules, furnished dorsally about at the middle with long seta directed towards the end of the furcula parallelly to the mucro; mucro long, only a little shorter than dens, straight, awl-like. The ratio of the lengths of manubrium : dens : mucro is as 1,8:0,8:0,6—7.

The anal spines are wanting; at the end of Abd. VI is inserted a pair of short, serrated setae.

A troglobionte, guanophile animal.

Afghanistan: Cave Tagheh Tehinah, on guano, 23 I 1958 .. 52 spec., in company with 1 spec. of *Megalothorax bonneti* STACH and 1 of *Pseudosinella inaequalis* STACH, leg. Dr. K. LINDBERG.

Acherontides bisetosus STACH, 1958

Body length 1,5—1,7 mm. Dorsally clothed with moderately long, curved setae indistinctly serrated on their frontal side and laterally on each segment with 1—2 bristles a little

longer, stiff and smooth. The curved setae are a little shorter than the claw, and appear as follows: on Thor. I 4 arranged in one transversal row, on Thor. II in three rows 4, 2, 4, on Thor. III — Abd. IV in two rows 4, 4, on Abd. V 4, 2, 4 and on Abd. VI 6 and a pair of long stiff bristles at the hind margin of this segment. — Skin covered with pretty large conical granules.

Antennae $2/3$ as long as the diameter of the head. The relative lengths of the joints are as 1,2:1,5:2,5:3. The third joint is separated from the fourth one, but the suture between them is indistinct. Sensory organ of third joint consists of high integumentary fold, behind it there are concealed two small globular sensillae; laterally at the basis of the fold a short fine olfactory hair is inserted on each side. Ant. IV with a retractile sensory papilla at the tip guarded by some longer and short fine hairs; subapically at the outer lateral side there are three oval sensillae arranged in a triangle, and on the inner side laterally one sensilla. On the outer side laterally are placed also 2 long, curved hairs very similar to olfactory hairs, but not as thick, as the latter.

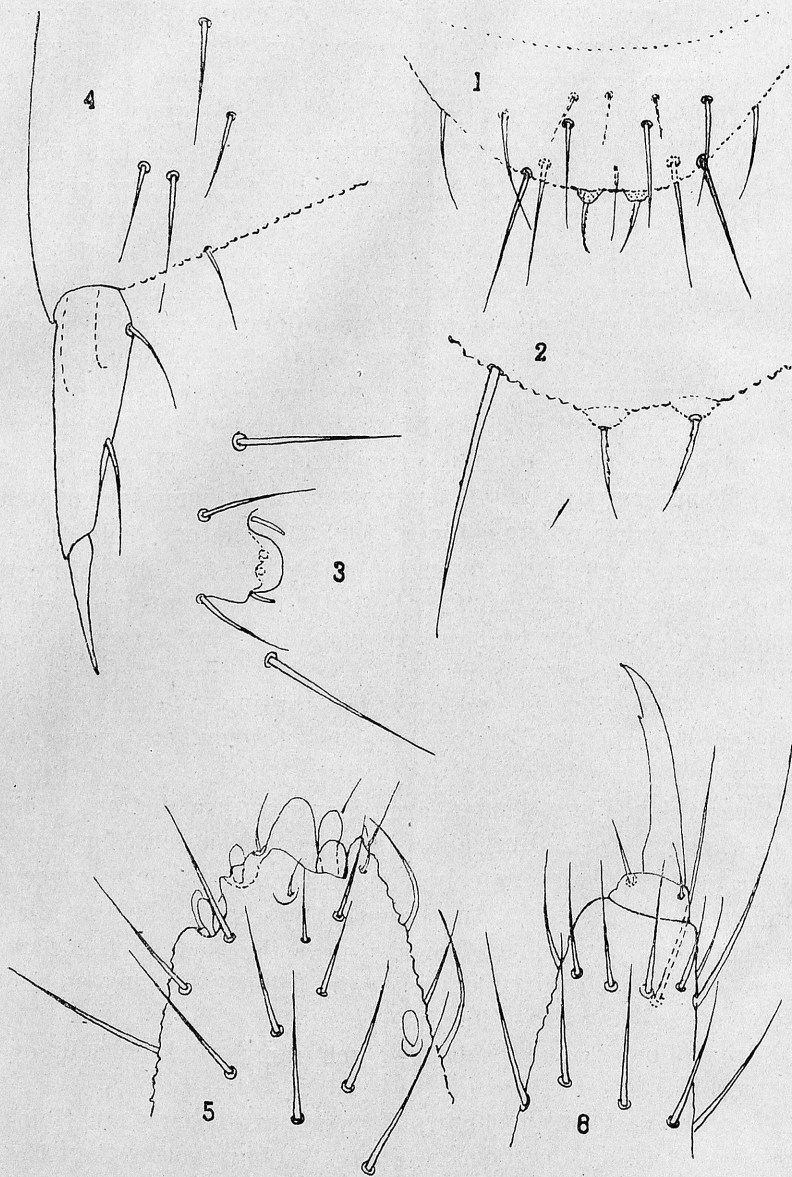
Postantennal organ and eyes are wanting.

Mouth parts similar to those in *Acherontides aspinatus* STACH.

Legs thick. Claw slender, armed only with a distinct, high placed inner tooth. Empodial appendage is absent, but one of the pretarsal hairs, namely that on the outer side, is placed so near to ventral side of the claw that it seems to be a needle-like empodial appendage. Dorsally near the basis of the claw there are placed two tibiotarsal hairs, almost as long as the claw, not thickened at the tip.

Tenaculum with 3 barbs on each ramus and no seta on the corpus.

Furcula well developed in all its joints, longer than tibiotarsus of the third leg (the ratio as 5:3), but shorter than the antennae (the ratio as 5:7,5). Manubrium broad furnished dorsally with three transversal rows of 6, 3, 4 long setae. Dens shorter than manubrium furnished dorsally with two setae. Mucro long awl-like. The ratio of the lengths of manubrium : dens : mucro is as 2,5:2:1.



Pl. II — *Acherontides bisetosus* STACH. — 1. Dorsal side of Abd. VI; 2. Papillae and setae at the end of Abd. VI, greater enlargement; 3. Sensory organ of Ant. III; 4. Furcula; 5. Ventral side of Ant. IV; 6. Distal part of second leg.

All body segments distinctly separated. The true anal spines are absent, but at the end of the Abd. VI there is a pair of distinct papillae, each armed with a moderately long distinctly serrated seta.

A troglophile species living on the layers of the bat-guano in the caves.

Afghanistan: Cave Kham Zindan (Darróh Chakh, Beltchiragh), on guano, 29 X 1957 .. 72 spec., together with 20 spec. of *Hypogastrura cavicola* BÖRN., leg. Dr. K. LINDBERG.

Acherontides crassus STACH, 1958

Body length 0,8 mm. Colour entirely white. Clothed dorsally with short curved setae arranged on the tergites in two transversal rows each composed of 4 setae, with exception of Thor. I and Abd. VI which are furnished with one row of setae only. These setae on anterior segments are only about $1/3$ times as long as the claw, on the posterior segments longer, about half as long as the claw. The serration of the setae is wanting or very indistinct. Laterally on each segment one or two stiff and smooth setae are inserted, but also only about half as long as the claw. Skin covered with relatively large conical granules.

Antennae thick and short, about $2/3$ as long as the diameter of the head. The relative lengths of the joints are as 1:1,3:1,5:2,8. Third joint of antennae separated from the fourth one. Sensory organ of third joint consists of high integumentary fold, behind it there is a pair of globular sensillae; on each side at the basis of this fold is inserted a fine, short olfactory hair. Fourth joint with a distinct retractile, simple sensory papilla at the tip, and subapically with three sensillae arranged on the outer side and one on the inner side of the joint. These sensillae have the form of conical sharply pointed vesicles.

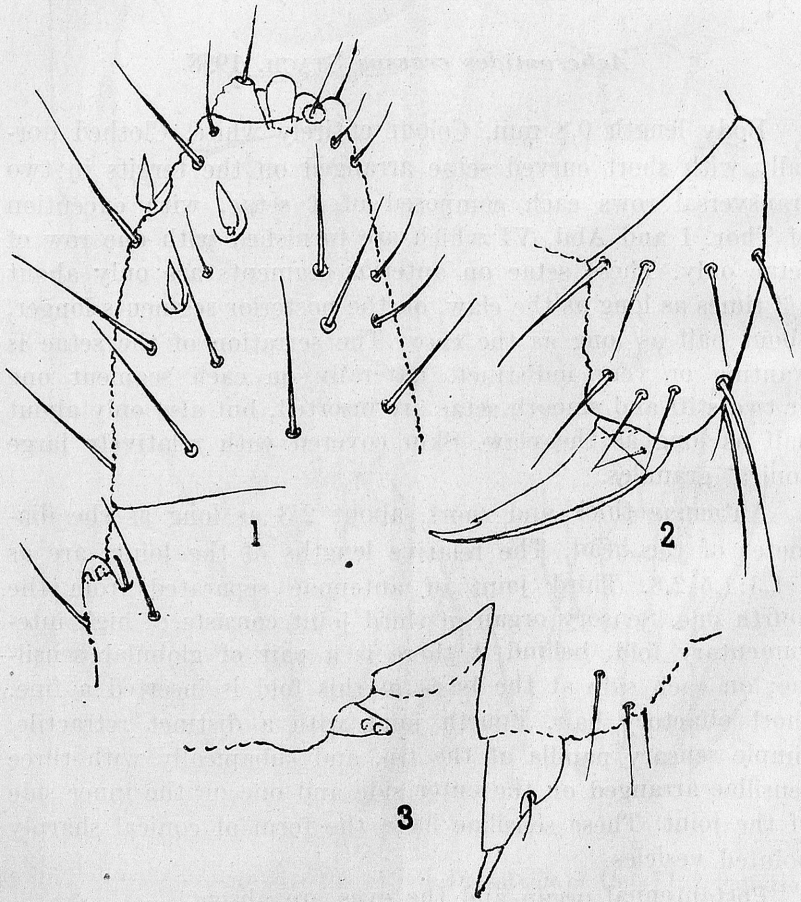
Postantennal organ and the eyes are absent.

The legs thick and relatively short. The claw is pretty broad at the basis, armed near to tip with a distinct inner tooth. Empodial appendage absent. Dorsally on each tibio-

tarsus a pair of long hairs about as long as the claw and not capitate at the tip.

Tenaculum with two distinct barbs on each ramus and no seta on the corpus.

Furcula short, but well developed in all its joints, as long as tibiotarsus of the third leg, and a little longer than the claw (the ratio as 2:1,4), shorter than the fourth joint of antennae. Manubrium a little longer than the dens, furnished at



Pl. III — *Acherontides crassus* STACH. — 1. Apical part of antennae; 2. Distal part of third leg; 3. Furcula and tenaculum.

the dorsal side with one transversal row of setae. Dens swollen at the basis, with a short fine seta at the half of its length, inserted dorsally in a distinct deepening. Mucro about 3 times shorter than dens, straight, ending with two very insistent minute teeth. The relative lengths of manubrium : dens : mucro are as 9:8:3.

All body segments distinctly separated. The anal spines and papillae are wanting.

A troglobionte, guanophile animal.

Afghanistan: Cave Kotouk (valley Ghourband), on guano, 29 VII 1957 .. 1 sp., together with 1 spec. of *Hypogastrura coprophila* STACH and 2 spec. of *Pseudosinella inaequalis* STACH.

SOME REMARKS ON THE SYSTEMATICAL POSITION AND GEOGRAPHICAL DISTRIBUTION OF GENUS *Acherontides* BON. AND THE RELATED GENERA

The genus *Acherontides* and its genotype *Acherontides atoyacense* are established by BONET, in 1945, on the basis of specimens occurring abundantly in the cave Atoyac, Veracruz in Mexico. In the following year this same very well-known naturalist found in an other mexican cave (C. de El Jobo), lying about 600 km far away from the Atoyac-cave the second species *Acherontides potosinus* Bon. To this new genus BONET has also referred the species *Beckerella spelaea*, described by JONESCO in 1922, from the cave Isverna (district Méhédintz) in East Carpathians, and YOSHII (1956) has added the fourth species *Acherontides vivax*, caught by him in the caves Irimizu and Inari-Kutsu in Japan. To these come at present three species found in the caves of Afghanistan.

We may range all the species as follows:

- | | |
|--|----|
| 1. Furcula well developed in all its joints | 2. |
| —. Furcula partly reduced or without the mucro | 6. |
| 2. Abd. VI with anal papillae | 3. |
| —. Abd. VI without anal papillae | 5. |

3. Anal spines present. Dens armed with two setae. Mucro long awl-like. Claw untoothed. Two tibiotarsal hairs, distinctly capitate at the tip
. *Acherontides vivax* YOSII, 1956
Japan (Caves Irimizu and Inari-Kutsu)
- . Anal spines absent; each anal papilla furnished with a seta 4.
4. Dens furnished with 4 setae. Claw with an inner tooth. Two tibiotarsal hairs, distinctly thickened at the tip. Mucro long awl-like
. *Acherontides spelaeus* (JONESCO, 1922)
(= *Beckerella spelaea* Jonesco, 1922) East Carpathians
(Cave Isverna, Méhédintz)
- . Dens furnished with 2 setae. Claw with one inner tooth. Two tibiotarsal hairs not thickened at the tip. Mucro long, awl-like. *Acherontides bisetosus* STACH, 1958
Afghanistan (Cave Kham Zindan)
5. Mucro almost as long as the dens, awl-like. Sesillae on Ant. IV oval. Dens with one seta as long as the mucro, straight, parallel to the mucro. claw with a pair of minute lateral teeth and with an inner tooth. Two tibiotarsal hairs, indistinctly thickened at the tip
. *Acherontides aspinatus* STACH, 1958
Afghanistan (Cave Tagheh Tchinah)
- . Mucro about half as long as the dens, very indistinctly bidentate at the tip. Sensillae on Ant. IV conical. Dens with one stout, curved seta. Claw with an inner tooth. Two tibiotarsal hairs, finely pointed
. *Acherontides crassus* STACH, 1958
Afghanistan (Cave Kotouk, valley Ghourband)
6. Dens shorter than tibiotarsus, furnished with two curved setae. Mucro ankylosed with the dens into mucrodens. Claw with an inner tooth. Two tibiotarsal hairs, distinctly clavate at the tip. Anal papillae their bases touching together, armed with spines
. *Acherontides potosinus* BONET, 1946
Mexico (Cueva de El Jobo)

- Dens very short, wart-like, about half as long as the claw, furnished with two setae. Mucro absent. Claw with an inner tooth. Two tibiotarsal hairs, distinctly clavate at the tip. Anal papillae their bases, touching together armed with straight spines
 *Acherontides atoyacense* BONET, 1945
 Mexico (Cave Atoyac in Veracruz)

To the genus *Acherontides* BON. is very near to the genus *Acherontiella* with the species *Acherontiella onychiuriformis*, both established by ABSOLON, in 1913, on the ground of the specimens caught in the cave Ifri Ivenan in Alger. The further species of this genus were found pretty late, namely only in 1945 by BONET in Mexico *Acherontiella sabina* as a troglobionte animal in two caves, and *Acherontiella epigea*, a species caught in one specimen outside cave in Tehuancán (Puebla). DELAMARE-DEBOUTTEVILLE has found a representative of this genus, *Acherontiella variabilis* DELAM., in France (caves in Ardèche and Gard), and in 1951 described together with CASEGNAU *Acherontiella bougisi* from the cave Antélias and in more numerous specimens outside caves in Beyrouth in Liban. Lately, in 1951, also GISIN described a species *Acherontiella xenylliformis* GIS. found in cave Ras el Qued near Taza in Central Atlas.

These species may be grouped as follows:

1. Sensillae on Ant. IV spherical. Anal spines absent . . 2.
 — Sensillae on Ant. IV cylindrical. Anal spines present. . 4.
 2. Two tibiotarsal hairs, distinctly capitate 3.
 — Dorsally on tibiotarsus only one moderately long hair, not thickened at the tip. Claw untoothed
 *Acherontiella onychiuriformis* ABSOLON, 1913
 Alger (cave l'Ifri Ivenon)
 3. Ant. IV with 5 sensillae on the outer side laterally arranged in various patterns and one on the inner side. At the end of Abd. VI a pair of short thick setae. Sensory rods in organ of Ant. III not covered by an integumentary fold. Claw untoothed. Two tibiotarsal hairs indistinctly thickened at the tip

Acherontiella variabilis DELAMARE DEBOUTTEVILLE, 1948
France (caves in dept. Ardèche and Gard)

- Ant IV with 3 sensillae arranged in a triangle on the outer side and one dorsally; sensillae with conical tip. Abd. VI with a pair of serrate setae at the end, not differing from the neighbouring ones. Claw untoothed. Tibiotarsal hairs capitate. *Acherontiella xenylliformis* GISIN, 1951
Alger (cave Ras Qued, near Taza)
- 4. Tibiotarsal hairs present 5.
- Tibiotarsal tenent hairs absent, but dorsally one thicker seta is inserted, pointed, not longer than other setae of tibiotarsus. Sensory rods in organ of Ant. III guarded at the front by a high fold. Sensillae on Ant. IV 3 on the outer and 1 on the inner side, short, relatively thick, not spherical. Claw untoothed. Anal spines on papillae the bases of which touch together. *Acherontiella bougisi* CASSAGNAU P. & DELAMARE DEBOUTTEVILLE, 1955
Liban (Cave Antélie, out side caves in Beyrouth)
- 5. Two tibiotarsal hairs, thickened at the tip. Sensory rods in organ of Ant. III not covered by a fold. Sensillae on Ant. IV 3 on the outer side and 1 on the inner one, similar to the typical olfactory hairs and curved. Claw with a pair of minute lateral teeth and one inner tooth. Anal spines short, strongly curved; the bases papillae touch together. *Acherontiella sabina* BONET, 1945
Mexico (caves: de los Sabinos, de La Boca, de Pachón, El Abra and others; outside caves near Aldana)
- Only one tibiotarsal hair very indistinctly thickened at the tip. Claw only with an inner tooth. In the rest of body-marks similar to preceding
. *Acherontiella epigea* BONET, 1945
Mexico (Tehuacán, Puebla)

GISIN (1951) refers to the genus *Acherontiella* BONET also the species found in the cave Buco del Quai (Isco-Brescia, Italy), determined by TARSIA in CURIA (1941) as *Willemia cavernicola* TARSIA. The authoress writes that this species has a long seta-like empodial appendage; but as all other cha-

racteristics of this species namely the absence of postantennal organ, of the eyes and furcula, and the presence of 3 + 1 spherical sensillae on Ant. IV, the untoothed claw and two tibiotarsal hairs are typical for *Acherontiella* BON., GISIN then supposed that the hair observed by Tarsia on the empodium was not empodial appendage, but one of the pretarsal hairs.

The difference between the genus *Acherontides* BON. and *Acherontiella* ABS. is restricted in fact to one detail only, namely the absence of furcula in *Acherontiella* ABS. Many other important body marks as the absence of postantennal organ, of the eyes and empodial appendage are common both these genera, and the presence or absence of anal spines is a fluctuating characteristic in the species of both genera.

Therefore would perhaps be more right to refer all the species of the genus *Acherontides* BON. to genus *Acherontiella* ABS.

It is very probably that the species of the genus *Acherontides* BON. and *Acherontiella* ABS. descend from the ancient representatives of the genus *Xenylla* TULLB., and also DELAMARE DEBOUTTEVILLE (1948) is of such an opinion on the origin of these genera.

Many morphological details bring namely both these genera near to the genus *Xenylla* TULLB. as the absence of the postantennal organ and empodial appendage in all species of *Xenylla* TULLB. The eyes are indeed present in *Xenylla* TULLB., but their number is reduced; claw with one inner tooth only or untoothed; two tibiotarsal hairs in most species; dens furnished dorsally with one or two setae; anal spines present or absent. Also the furcula is well developed and sometimes with a long, awl-like mucro eg. in *X. obscura* FOLS., *X. humicola* O. FABR., *X. affiniiformis* STACH, *X. littoralis* WOM. and oth., or very often the mucro is reduced to mucrodens e. g. in *X. obscura* IMMS, *X. brevicauda* TULLB., *X. grisea* AXELS., *X. pseudomaritima* JAMES and oth., or also without the mucro as e. g. *X. borneri* AXELS. And even the sensillae on Ant. IV are in most part arranged: 3 on the outer and 1 on the inner side of this joint, indeed mostly in the form of typical olfactory hairs, but sometimes also spherical as e. g. in *X. planipila* STACH.

Not far away from *Acherontides* BON. lies in the system the place of *Mesachorutes* ABS. and *Mesogastrura* BON., two

genera the species of which are almost all troglobionts. In common with *Acherontides* BON. they have well developed furcula furnished with long, awl-like mucro; claw armed only with an inner tooth; two, rarely one, tibiotarsal hairs; no pigment; and no anal spines in most species. Both genera differ, however, by having eyes, it is true reduced in number generally to two only on each side of the head, rarely to 3 or 4; by the presence of postantennal organ, and empodial appendage which, however, is weakly developed, sometimes in shape of a fine seta. The postantennal organ is in *Mesogastrura* BON. generally in the form of four weakly marked vesicles, not separated one from the other, but strictly joined together on a wide distance and with the central tubercle, then in form of a still weakly developed primitive stage of the primary single organ.

Both these genera, also the other ones coming near, as *Choreutinula* PACLT (= *Beckerella* AXELS.), *Schöttella* SCHÄFF. and others have raised many difficulties in the right way to group them, as I have noticed (1947) in my Monograph of Apterygotan Fauna of Poland (pp. 167—168). Thus DENIS, in 1931, referred most species of these genera to genus *Schöttella* SCHÄFF., BONET, in 1931, to *Mesogastrura* BON., and DELAMARE DEBOUTTEVILLE, in 1947, to *Mesachorutes* ABS.

I ordered all species of these genera known in 1949 on a table (p. 169) according to their more significant characteristics, namely the form of postantennal organ, empodial appendage and mucro, the number of eyes and tibiotarsal hairs, also the possession of the spines and pigment, and expressed my opinion that if we extend the primary diagnosis of the genus *Choreutinula* PACLT, we may join all species of these genera coming near together furnished with the postantennal organ into one only. But it is more rational to divide such a large group of species into smaller ones and in that case more nearly related together. I have also proposed to consider as separate genera all the five genera *Choreutinula* PACLT, *Schöttella* ÅGR.), *Mesogastrura* BON., *Mesachorutes* ABS. and *Typhlogastrura* BON. the species of which are registered on the table.

It is not easy also to indicate more accurately a probable ancestor of all these genera, and even that of the doubtless

nearly related cavernicolous genera *Mesachorutes* ABS. and *Mesogastrura* BON. Such an ancestor must be sought among the Hypogastrurines having a postantennal organ in a primitive form of a single tubercle. It may be supposed that in the following generations of such a Hypogastruride, living further constantly in caves as a true troglobiont, the postantennal organ at first simple was submitted to evolution in which the surface of the organ was increased and from the single tubercle of this organ there arose laterally four, afterwards many vesicles more or less strictly united with the central part of the organ.

By supposing this it must be accepted that the postantennal organ fulfils a function which for animals living constantly in caves under the influence of specific life-conditions is more often necessary and therefore increases its size.

However, the meaning of the postantennal organ for the *Collembola* is not yet with certainty explained in spite of the studies of many authors (WILLEM, BECKER, DENIS and others) lately (1949) also of H. MARCUS.

But the representatives of the group *Acherontiella* ABS. and *Acherontides* BON. — the terricole hypothetical ancestor of which seems to be doubtlessly *Xenylla* TULLB., a Collembola having no postantennal organ, — did not regenerate this organ although these representatives live already constantly in caves.

It must then be supposed, that either the meaning and function of the postantennal organ is not as significant for the *Collembola*, as some of them with by the same manner of life, here in caves, have this organ or not, or that this organ once wholly reduced, as in *Xenylla* TULLB. cannot be regenerated by its descendents although they live constantly during many generations in caves, and this according to DOLO's rule of evolution in nature.

This fact seems to show that the terricole ancestor of *Mesachorutes* ABS. and *Mesogastrura* BON. should be sought for in an other group of Hypogastrurines than that of which *Acherontiella* ABS. and *Acherontidaes* BON. are descendants, namely among forms furnished with a postantennal organ.

Also the geographical distribution of both group of species

Acherontiella ABS. — *Acherontides* BON. and *Mesachorutes* ABS. — *Mesogastrura* BON. is interesting.

The species of the genus *Acherontides* BON. are known at present from East Carpathians (*A. spelaeus* ION.), Afghanistan (*A. bisetosus* STACH, *A. aspinatus* STACH, *A. crassus* STACH) and Japan (*A. vivax* YOSII), then from areas lying very far away one from the other in southern Palearctic. Two species *A. atoyacense* BON. and *A. potosinus* BON. occur also in Mexico, but they differ pretty considerably from the palearctic species.

The representatives of the genus *Acherontiella* ABS. are distributed in the Mediterranean part of Palearctic, namely in Liban (*A. bougisi* CAS. & DELAM.), North Africa (*A. onychiuriformis* ABS., *A. xenylliformis* GIS.) and France (*A. variabilis* DELAM.). Also in this genus there are two Mexican species (*A. atoyacense* BON., *A. sabina* BON.) with characteristics more different from those in palearctic species, and because of this DELAMARE DEBOUTTEVILLE, in 1948, has proposed for them a separate genus *Acherontiellina* DELAM., which he cancelled afterwards (1955).

The species of two cavi-colous groups of the related genera *Mesogastrura* BON. and *Mesachorutes* ABS. inhabit generally the territory of the Europe westward from the oblique line Kraków (about 20 meridian) — Italy. But also here we meet species occurring in Japan (*Mesogastrura kuzuensis* YOSII) and one, living outside caves in Nearctic (*Mesachorutes thomomys* CAMBERLAIN).

The Japanese cave Irimizu in which *Acherontides vivax* YOSII lives and the caves near Kuzu in which *Mesogastrura kuzuensis* YOSII occurs lie pretty near together, but these species differ in many significant body-details one from the other. On the other hand between *Acherontides vivax* YOSII and *Acherontides spelaeus* (ION.) from the cave Isverna in the Roumanian East Carpathians the differences are restricted only to the presence in *Acherontides vivax* YOSII of anal spines and two dental setae, instead of four in *Acherontides spelaeus* (ION.). Also the Japanese *Mesogastrura kuzuensis* YOSII differs only very little from the Central European ones e. g. *Mesogastrura ojcowiensis* (STACH) from a cave in Poland, namely

by 3 eyes on each side of the head and by one very strong seta of the four arranged on the dentes (in *Mesogastrura ojcoviensis* only 2 eyes and all four dental setae equally long and thick).

The Japanese caves lie on the territory which, according to YOSII, belong to the geologically oldest part of Honschin-Island, and this author supposes that both the species living as troglobionts in the caves inhabit them since a very ancient time, namely the Miocene period.

I have mentioned in 1919 and 1949 that *Mesogastrura ojcoviensis* (STACH) belongs in the Polish caves to the not numerous troglobionts, and should be considered as a relict from the preglacial warm time. Its near relatives live at present only in southern caves, as *Mesogastrura carpetana* BON. and *Mesogastrura levantina* BON. in Spain, and *Mesogastrura boneti* TARSIA in Italy, or also occurring outside caves as *Mesogastrura intermedia* DEN. in Brescia, Italy.

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STRESZCZENIE

Autor opisuje szczegółowo trzy gatunki z rodzaju *Acherontides* BON. znalezione przez Dra K. LINDBERGA w jaskiniach Afganistanu.

W związku z tym rozpatruje znamiona blisko spokrewnionego rodzaju *Acherontiella* ABS., pozbawionego podobnie jak *Acherontides* BON. narządu pozaczulkowego, a także pokrewnych, nieco dalej stojących w systemie *Mesachorutes* ABS. i *Mesogastrura* BON., których gatunki nie posiadają narządu pozaczulkowego.

Niemal wszystkie gatunki tych czterech rodzajów należą do form żyjących stale w jaskiniach i pochodzą niewątpliwie od przodków żyjących niegdyś poza jaskiniami. Podczas gdy przodkiem takim dla dwóch pierwszych rodzajów był *Xenylla* TULLB. z bardzo dużym prawdopodobieństwem, albowiem

wszystkie jego gatunki nie posiadają narządu pozaczulkowego, a innymi cechami zbliżają się do form jaskiniowych, to znalezienie prawdopodobnego przodka, żyjącego na powierzchni ziemi, dla drugiej grupy nie jest łatwe, jakkolwiek musiał on znajdować się wśród dużej rodziny *Hypogastruridae*.

Autor porusza przy tym zagadnienie znaczenia narządu pozaczulkowego u skoczogonek, które nie jest dotychczas dostatecznie wyjaśnione. W grupie jaskiniowych gatunków rodzaju *Mesachorutes* ABS. i *Mesogastrura* BON. następuje stopniowy rozwój tego narządu z zasadniczej postaci jednego wzgórka we wielowzgórkowy. Natomiast u gatunków rodzaju *Acherontides* BON. i *Acherontiella* ABS., pędzących takie same życie, stale w jaskiniach, narządu tego brak i nie ma śladów jego odtwarzania (prawo DOLA), ani zastępowania jego braku przez inne narządy o pokrewnym działaniu.

Rozsiedlenie geograficzne przedstawicieli obu tych grup jest szerokie, lecz ze znacznymi disjunkcjami. I tak *Acherontides* BON. występuje w południowej Palearktydzie (Rumunia, Afganistan, Japonia) z pięcioma gatunkami, każdy w jednej jaskini, nadto dwa nieco bardziej zmienione gatunki występują w Meksyku. *Acherontiella* ABS. żyje w jaskiniach krajów śródziemnomorskich (Francja połudn., Półn. Afryka, Liban) z czterema gatunkami, nadto dwa bardziej odmienne gatunki żyją w Meksyku. Przedstawiciele rodzajów *Mesogastrura* ABS. i *Mesachorutes* BON. zgromadzone są w zachodniej Europie, na zachód od linii, nieco skośnie biegnącej, od Krakowa do północnych Włoch. I wśród nich jeden gatunek spotykamy w Japonii (*Mesogastrura kuzuensis* YOSH, a jeden w Półn. Ameryce, znaleziony w norze gryzonia *Thomomys* sp.

Mimo tak znacznych disjunkcji w rozsiedleniu gatunków tych czterech rodzajów oraz odcięcia ich od życia na powierzchni ziemi, podobieństwo w budowie różnych części ciała jest u gatunków tego samego rodzaju bardzo duże. Np. gatunek *Mesogastrura ojcoviensis* (STACH) żyjący tylko w Jaskini Nietoperzowej w Jerzmanowicach koło Ojcowa jest niemal zupełnie podobny do żyjącego także tylko w jednej jaskini w Japonii *Mesogastrura kuzuensis* YOSH.

Jaskinie, w których występują w Japonii *Mesogastrura kuzuensis* YOSH i *Acherontides vivax* YOSH położone są na

najstarszej części obszaru wysp japońskich i Yosu przypuszcza, że gatunki te żyją w tych jaskiniach od odległych czasów, prawdopodobnie miocenu. *Mesogastrura ojcoviensis* (STACH), jeden z niewielu traglobiontów w Polsce, najbliższych krewniaków posiada w gatunkach zamieszkujących jaskinie Hiszpanii i półn. Włoch. I on należy do relikтів pozostałych z okresu cieplejszego, prawdopodobnie okresu przedlodowcowego.

РЕЗЮМЕ

Автор подробно описывает три вида из рода *Acherontides* BON., найденные д-ром К. Линдбергом в пещерах Афганистана.

В связи с этим, автор обсуждает признаки рода *Acherontiella* ABS. близко стоящего к роду *Acherontides* BON. и не имеющего, как и он, постантеннального органа, а также родственных, но далее стоящих в систематическом порядке, родов *Mesachorutes* ABS. и *Mesogastrura* BON., виды которых тоже не имеют постантеннального органа.

Почти все виды этих четырех родов постоянно живут в пещерах и происходят несомненно от предков, живших когда-то вне пещер. По всей вероятности предком двух первых родов был род *Xenylla* TULLB., так как все виды к нему принадлежащие, лишены постантеннального органа, а по другим признакам приближаются к пещерным формам. Найти однако жившего на поверхности земли правдоподобно предка другой группы, не так легко, хотя он должен находиться в большом семействе *Hypogastruridae*.

Автор затрагивает при этом вопрос значения постантеннального органа у *Collembola*. Значение этого органа доныне не было достаточно выяснено. В группе пещерных видов рода *Mesachorutes* ABS. и *Mesogastrura* BON. происходит постепенное преобразование этого органа из основного типа — одного бугорка. в тип многобугорчатый. Вместо этого, у видов рода *Acherontides* BON. *Acherontiella* ABS. которые ведут такой же постоянный пещерный образ жизни, постантеннальный орган отсутствует и нет у них никаких следов его возобновления (закон Доля) или замещения его каким-нибудь другим органом с подобным действием.

Географическое распространение обеих групп очень широко, но со значительными дисюнкциями. И так, род *Acherontides* BON. появляется в южной Палеарктике (Румыния, Афганистан, Япония) в пяти видах, по одному виду в каждой пещере. Кроме того, два вида, немного более измененные, встречаются в Мексике. Род *Acherontiella* ABS. с четырьмя видами живет в пещерах средиземноморских стран (южная Франция, северная Африка, Ливан). Кроме этого, два более измененных вида живут в Мексике. Представители родов *Mesogastrura* ABS. *Mesachorutes* BON. собраны в западной Европе, к западу от линии, проходящей немного косо от Кракова вниз до северной Италии. И среди них один вид встречается в Японии (*Mesogastrura kuzuiensis* YOSII), а другой, в северной Америке; найден он был в норе грызуна *Thomomys* sp.

Помимо так значительных дисюнкций в распространении видов этих четырех родов и отделении их от жизни на поверхности земли, сходство в строении различных частей тела у видов одного и того же рода очень велико. Например, вид *Mesogastrura ojcoviensis* (STACH), живущий в одной только пещере Нетопежовой в Ежмановицах около Ойцова, почти совсем похож на живущего также только в одной пещере в Японии *Mesogastrura kuzuiensis* YOSII.

Пещеры, в которых живут в Японии *Mesogastrura kuzuiensis* YOSII и *Acherontides vivax* YOSII, находятся в самой древней части территории японских островов. Поэтому Есии полагает, что виды эти живут в этих пещерах с очень древних времен, вероятно со времени миоцена. *Mesogastrura ojcoviensis* (STACH), один из немногих троглобиоптных видов Польши, имеет ближайших родственников среди видов, обитающих в пещерах Испании и северной Италии. Вид *Mesogastrura ojcoviensis* (STACH) относится к реликтам принадлежащим к более теплomu периоду, по всей вероятности предшествующему периоду ледниковому.

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