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Taxonomy in Hydrophilidae. Practical experience and advice. (Coleoptera: Hydrophilidae)

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ABSTRACT

Practical advice and working notes on some genera of water beetles for mounting, identification, description, and naming of new species and genera, including a revised key to Anacaenini.

KEY WORDS

Insecta, Coleoptera aquatica, practical advice.

INTRODUCTION

After about forty years, experience in determination thousands of water beetles and the description of some hundred Hydrophilid species with a few new genera, also after ten years, teaching entomology in the university - one is not perfect, but one has made so many mistakes that this experience should not be lost.

This is the reason why in this paper I will give some advice to younger colleagues who have decided to work with the water beetles, especially with the family Hydrophilidae. I will do this not in a long-winded history, but in a telegraphic style ease of transparency and availability.

A. General features of working with water beetles

I. A dozen pieces of advice for the worker in aquatic Coleoptera

1. Make sure you have access to a beetles collection for the family you work with for comparison! A reference collection is more effective than the best key.

2. Try to identify the water beetles principally when mounted and well dried! In wet condition (alcohol) many characters such as microsculpture, colour, pubescence, etc. are hard to recognise and can cause misidentifications.

3. Well-mounted is half-identified. Legs, antennae and palpi should be visible. This is not a problem in the flatter Hydrophilidae, but more difficult in the strongly convex Dytiscidae, Haliplidae, Gyrinidae, and Heteroceridae. In these genera the extremities can be glued to the body with water solubile paper paste for better protection against damage (especially during postage transport). The American mode of fastening the beetles, quite unprotected, on a point cardboard should be avoided. The male genitalia should be glued flat at the left side behind the beetle; the female genitalia (if necessary) at the right side for quick identification.

4. The suitable adhesive guarantees often the result:
a) Glutoline (= paper paste) to use for beetles with flat undersides (Hydrophilidae, Hydraenidae).
b) Syndeticon (= fish glue) to use for beetles with convex underside (Dytiscidae, Gyrinidae, Haliplidae, Heteroceridae).
c) Uhu should be need only for very large beetles (*Dytiscus, Cybister, Acilius, Graphoderus, Hydrophilus, Hydrochara*).
Nowadays it is no longer usual to pin beetles. Also large beetles can be mounted on thick cardboard. Micro-pins are no more recommendable because of their instability.

5. The recommended size of pins is 4 or 5. The cards are less likely to twist.

6. To avoid twisting of locality and determination labels (nowadays easily to print by computer, in letter sizes 5-6), these should be copied on stiff cardboard.

7. Species of difficult genera as Hydraena, Ochthebius, Limnebius, Laccobius, Dryops, and Coelostoma should be dissected immediately after mounting, when sufficiently dried. Thus you avoid the troublesome softening process.
8. Do not put more than one beetle on a card! Very similar specimens sometimes prove to be different species.
9. For cleaning the dirty or fatty surface of a beetle use liquid ammonia. The microsculpture will be more easily visible.
10. To soften older specimens for dissecting use hot vinegar for a few hours.
11. The aedeagus should be conserved behind the beetle with Glutuline or upon a separate pinned celluloid card with DMHF. Conservation on a microscopic slide causes often the loss of this organ.

II. Considerations for naming new species

Frequently the specialist is uncertain in the appropriate naming of a new species or genus in connection with a revision of a beetle family of a genus. The ICZN principally recommends a derivation of the name from Greek - naming genera, and a derivation from Latin for naming species.

For the non-Latinist the NOMENCLATOR COLEOPTEROLOGICUS (SCHENKLING, 1922) offers a rich collection of names. The Latinist can compose a name himself on this base. In the etymology of both Botany and Zoology contains curious abuses concerning the names of species. The naming should be carried out with certain seriousness and it should be ingenious. The new name has to be valid and expressive. A few rules are useful for this matter.

1. Striking characters (colour, sculpture, brightness, shape) have priority.
   (e.g. *falcarius, bicolor, rugosus, splendidus, exstriatum* etc.)

2. In less distributed or even endemic species the name should be derived from the type locality.
   (e.g. *congoensis, altaicus, formosanus* etc.

3. In supposed adelphotaxa (twin species) the name of the new twin should be derived from the twin that is already known.
   (e.g. *Para-, Pseudo-, -oides, -morphus* etc.)

4. Are more species of a species-complex to name, then it is useful to adapt the following names to the etymology of the first or to create anagrams.
   (e.g. *congruens-conjectus-consimilis*; *Cercyon-Ercycon; Morastus-Armostus* etc.).

5. Where there is no other reason against it, the new species or genus can be named after its discoverer.
   (e.g. *holdhausi, kocai, jaechi, hansmuehlei* [male]; *karinkukolae* [female]; the combination of Christian name and last name is possible; vowel-mutations should be indicated as diphthongs *(schoedli)*; generally the name can be given in the genitive *(hauseri, annae)* or in an extension *(hauserianus, bruchianus)*.

   Controversial is the question whether the genitive is to derive from the original name: <Fabricius> ---<*fabriciusi*> ; <Sturm> ----<*sturmi*> or to derive from the latinised name: <Fabricius> ----<*fabricii*>; <Sturm> ---- <*sturmii*>. The former seems to be more wise, but the latter is usable today. Male names ending in -a (e.g. *Koca*) will be not declined to -ae (*kocae*) but to -i (*kocai*); similar: Wasastjerna ----à *wasastjernai*.

6. Species with striking or unusual ecology should be named after their way of life or after their type of habitat.
   (e.g. *hygropetrica, thermalis, subterraneus, frigidus, orobius, crenatus, celer* etc.).

B. Special features in Hydrophilidae

Many ancient descriptions of new taxa are almost worthless or meaningless because they enumerate solely common characters and do not recognize the really specific features (often on underside). Every genus needs a special list of relevant taxonomic characters for better comparison of similar species or twin species.

I a. Characters differentiating Anacaenini

1 a. Body shape globular
b. Body shape more oval or flat

2 a. Eyes more or less strongly emarginate anteriorly
b. Eyes hardly emarginate anteriorly

3 a. Antennae 7- or 8-segmented
b. Antennae 9-segmented

4 a. Maxillary palpi at most half as long as width of head
b. Maxillary palpi long, more than 4/5 x as long as width of head

5 a. Ultimate segment of maxillary palpi blackened apically
b. Maxillary palpi unicoloured (pale, black)

6 a. Maxillary palpi bending in a zigzag-like manner (i.e. apical segment directed somewhat outwards)
b. Maxillary palpi normal (i.e. with apical segment directed somewhat inwards)

7 a. Elytra with distinct rows of serial punctures, at least posterior
b. Elytra without distinct serial punctures

8 a. Elytra with sutural stria in c. posterior half
b. Elytra without sutural stria

9 a. Prosternum flat or slightly convex in middle, without median carina
b. Prosternum tectiform, with median carina

10 a. Mesoventrite flat or with blunt posteromedian bulge
b. Mesoventrite with sharply defined posteromedian elevation

11 a. Posterior femora glabrous
b. Posterior femora densely punctate at least in about basal half

I b. Relevant taxonomic characters in *Anacaena* species

1 a Antennae 8-segmented
b Antennae 9-segmented

2 a Head with pale preocular patches
b Head without preocular patches

3 a Pubescence of posterior femora extended
b Pubescence of posterior femora more or less reduced or even absent

4 a Middle portion of mesoventrite with a small dentiform process behind middle
b Middle portion of mesoventrite not dentiform but with a transverse ridge

I c. Updated key to the genera of Anacaenini

Since the keys to the genera of Hydrophiloidea published by Hansen (1991) several new genera have been described (Gentili, 2002; Hansen, 1999; Hansen & Schödl, 1997; Hebauer, 1997, 2002, Jia, 1998). So it becomes necessary to revise some of the keys.

After the recently published updated key to the genera of Laccobiini (GENTILI, 2003; removing *Pseudopelthydrus*, which has proved to be a synonym of *Agraphydrus*) I will give an updated key to the genera of Anacaenini in this paper.

1. Mesosternum flat or at most with blunt posteromedian bulge. Elytra with distinct rows of serial punctures, at least posteriorly — **2**

- Mesosternum with sharply defined posteromedian elevation, if not (some *Anacaena*), then elytra without distinct serial punctures — **6**

2. Elytra with very conspicuous rows of punctures, which are markedly coarser than those of the interstices, the rows abbreviated in about anterior third. Body broad and very convex, almost semiglobular.- South Africa — ***Grodum* HANSEN, 1999**

- Elytral rows of punctures distinct but less conspicuous, sometimes only detectable apically, their punctures not much coarser than those of the interstices. Body more oval or elongate, moderately to weakly convex — **3**

3. Head very short and transverse, well over 2 x as wide as long (from anterior clypeal margin to posterior eye margin). Labrum rather strongly deflexed. Posterior femora glabrous, except sometimes for the extreme anterobasal angle — **4**

- Head longer and less transverse, not 2 x as wide as long. Labrum hardly deflexed. Posterior femora densely pubescent in about basal half, sometimes only along the anterior margin — **5**

4. Abdominal ventrites uniform, entirely dull and densely pubescent. Elytra with sutural stria reaching almost to scutellum. Body rather convex.- Madagascar — ***Enigmata* HANSEN, 1999**

- Abdomen with 3 basal ventrites dull and densely pubescent, a small posteromedian portion of 3rd, as well as entire 4th and 5th ventrite, smooth, shiny and glabrous (except for few posterior setae). Elytra with sutural stria abbreviated in anterior third. Body rather flat.- Tasmania — ***Phelea* HANSEN, 1999**

5. Maxillary palpi at most half as long as width of head. Elytra usually with rather inconspicuous serial punctures (these sometimes only detectable posteriorly). Antennae mostly 9-segmented, sometimes 8-segmented.- Worldwide — ***Crenitis* BEDEL, 1881**

- Maxillary palpi long and rather stout, more than 4/5 x as long as width of head. Elytra with distinct, sometimes slightly striiform rows of serial punctures. Antennae 8-segmented.- Australia — ***Notohydrus* BALFOUR-BROWNE, 1939**

6. Prosternum flat or slightly convex in middle, without median carina. Elytra with or without serial punctures — **7**

- Prosternum tectiform, with median carina — **8**

7. Elytral punctation seriate or subseriate, at least apically. Eyes usually more or less strongly emarginate anteriorly, sometimes completely divided into dorsal and ventral parts. Antennae 8-segmented.- Australian region — ***Paranacaena* BLACKBURN, 1888**

- Elytral punctation irregular, not distinctly seriate or subseriate. Eyes hardly emarginate anteriorly, always entire. Antennae usually 9-segmented, rarely 7- or 8-segmented.- Worldwide, except Australian region — ***Anacaena* THOMSON, 1859**

8. Elytral punctuation never seriate — **9**

- Elytra with distinct series in apical third. Femora flattened and pubescent. Antennae 9-segmented. Eyes with canthus.- Thailand — ***Hebauerina* GENTILI, 2002**

9. Elytra with sutural stria in ca. posterior half. Maxillary palpi normal, i.e. with apical segment directed somewhat inwards.- Worldwide — ***Paracymus* THOMSON, 1867**

- Elytra without sutural stria. Maxillary palpi bending in a zigzag-like manner, i.e. with apical segment directed somewhat outwards.- Neotropical and Oriental regions — ***Notionotus* SPANGLER, 1972**

II. Relevant taxonomic characters in *Laccobius* species

1 a Head, pronotum, elytra smooth, shining
b Head, pronotum, elytra dull, shagreened

2 a Head with pale preocular spots
b Head without preocular spots

3 a Eyes of normal size
b Eyes striking large, the distance between the eyes less than 2 x the diameter of one eye

4 a Labrum of males with a pair of transverse shining plates
b Labrum of males without transverse shining plates

5 a Pronotum with a dark discal patch
b Pronotum without a distinct discal patch

6 a Claws evenly curved
b Claws strongly curved to base, distally almost straight with inner face bisinuate

7 a Elytra irregularly punctate
b Elytra more or less seriate

8 a Elytral series of punctures almost regular
b Elytral series of punctures alternating

9 a Posterior tibiae curved
b Posterior tibiae straight

10 a Base of mesofemora with a patch of yellow hairs
b Base of mesofemora without a distinct patch of hairs

III. Relevant taxonomic characters of *Dactylosternum* species:

1 a Body flattened
b Body convex

2 a Eyes hardly emarginate anteriorly
b Eyes strongly emarginate anteriorly

3 a Antennal scape c. 5 x as long as pedicel
b Antennal scape c. 2 x as long as pedicel

4 a Antennal club compact
b Antennal club loose

5 a Punctation of pronotum forming normal round punctures
b Punctation of pronotum forming fine v-shaped scratches

6 a All elytral striae visible
b At most the lateral pair of elytral striae visible

7 a Elytra posteriorly with impressed sutural stria
b Elytra without impressed sutural stria

8 a Gula well developed, not particularly narrowed anteriorly
b Gula strongly narrowed anteriorly, in the anterior half narrow and parallel-sided

9 a Prosternum normally developed
b Prosternum very short

10 a Prosternum carinate medially
b Prosternum not carinate medially

11 a Prosternum without or with fine dentiform process anteromedially
b Prosternum with pronounced anteromedian process

12 a Mesosternum without cavities for reception of procoxae
b Mesosternum with cavities for reception of procoxae

13 a Mesosternal elevation broad (normal), arrowhead shaped
b Mesosternal elevation narrow, parallel-sided

14 a 1st segment of hind tarsi only little longer than 2nd segment
b 1st segment of hind tarsi almost twice as long as 2nd segment

Annotations:

A group of oriental species differs from ´typical´ *Dactylosternum* by:
- **a)** relatively short prosternum (not longer than in e.g. *Rhachiostethus*),
- **b)** mesosternal elevation narrow linear (reminiscent of *Phaenonotum*),
- **c)** round, convex body with elytral striae more or less obsolete, particularly on dorsal portion, where they may be completely absent - elytra rather explanate in some spp.,
- **d)** pronotum with "gull"-puncture (shaped like an r or v).

IV. Relevant taxonomic characters of *Coelostoma* species:

1 Size and shape

2 **a** Surface/underside unicoloured black
b Surface or sides/underside castaneous

3 **a** Punctation (coarseness) of pronotum not denser than of elytra
b Punctation of pronotum distinctly denser than of elytra

4 **a** Elytral apex simply sloping
b Elytral apex flattened, slightly explanate

5 **a** Elytra uniformly punctate, without traces of series
b Elytra laterally coarser punctate, with traces of series there

6 **a** Elytra/pronotum covered with reticulate microsculpture
b Elytra/pronotum smooth and shining

7 **a** Prosternum not dentate anteriorly
b Prosternum dentate anteriorly

8 **a** Mesofemora not pubescent, glabrous, more or less coarsely punctate
b Mesofemora densely pubescent except apical portion

9 **a** Metafemora normally flattened, not triangularly enlarged at hind margin
b Metafemora with hind margin triangularly enlarged

10 **a** 1st ventrite not carinate medially
b 1st ventrite with more or less extended carina

11 **a** 5th ventrite feebly emarginate in the middle
b 5th ventrite entire

12 Aedeagus

V. Characters differentiating Megasternini:

1 Clypeus margined / not margined

2 Clypeal margins not deflexed / deflexed

3 Clypeus simply truncate anteriorly / emarginate anteriorly / quadrilobate

4 Eyes small / moderately large/very large, separated by about .... x the width of one eye

5 Pronotal hind margin unmargined / margined

6 Pronotum with / without a transverse series of coarser punctures along posterior margin

7 Sides of pronotum deflexed / not deflexed

8 Prosternal length (at shorter place) [length : width]

9 Prothoracic antennal grooves (size) [degree of extension over hypomeral portion]

10 Prothoracic antennal grooves (degree of lateral + posterolateral demarcation)

11 Midprosternum abruptly raised / smoothly raised

12 Midprosternum: transverse ´convexity´

13 Midprosternum median ridge strong / fine / absent

14 Midprosternum demarcated by ridges / not demarcated by ridges; apical notch (size)

15 Epipleural width: metepisternal width (at midlength of metepisternum): c. as wide (*Nipponocercyon*!)

16 Epipleural orientation (at level of metepisternum): horizontal (Nipponocercyon!)

17 Femora with sharply defined tibial grooves / without grooves

18 Metasternum (laterally) + metepisterna + ventrites densely pubescent / sparsely pubescent / glabrous

19 Metasternum without femoral lines / with complete femoral lines / with femoral lines abbreviated anteriorly / posteriorly

20 Metasternum with / without anterolateral ridge corresponding to the arc described by the tip of hind femora

21 Metasternum length

22 First ventrite carinate medially
First ventrite with / without numerous fine longitudinal ridges on each side of median carina

23 Elytra with 10 equally impressed striae (stria 10 distinct from base at least to midlength of elytra)

24 Elytra with 10 striae (but 10th rudimentary, in length and / or appearance)

25 Elytra with 9 equally impressed striae (10th stria indetectable)

26 Elytral striae not quite reaching elytral base / reaching basal margin

27 Elytral series becoming coarser laterally and / or apically

28 Elytral interstices flat or weakly convex / moderately convex / strongly convex

Cercyon **sp.n.- description features:**

Pronotum - widest at base, strongly (moderately) narrowed anteriorly, without transverse series of (coarser) punctures along posterior margin
margin (rim) (not) continued round posterior angle,

Elytra - with (9) 10 (rather, strongly, hardly, finely) impressed and (moderately) finely (strongly) punctate striae.

Epipleura oblique (almost horizontal) at level of metasternum.

Prosternum - rather flat (shallowly, strongly) tectiform and finely (strongly, sharply) carinate medially.
midprosternum …….
prosternal process attaining midpoint of coxae without (with) a small apical notch.

Elevated middle portion of mesothorax elongate oval (subparallel, laminate. -shaped), c. (4) x as long as wide, widest in the middle (anteriorly, behind), point anteriorly (posteriorly).
1st ventrite c. 1.5 x as long as 2nd ventrite, carinate medially. with(out) numerous (fine, strong) longitudinal ridges on each side of median carina.
1st segment of hind tarsi 1.5 x as long as 2nd segment (as long as 2nd + 3rd segments together).

Metasternum dull, finely (coarsely) punctate;
- elevated middle portion shining, finely, distantly, (strongly, densely)..punctate, penta gonal…
- with(out) femoral lines,
- with(out) anterolateral arcuate ridge corresponding to the arc described by posterior femora.
- with (strongly), (but) gradually raised, only moderately convex, (narrow to) wide, middle portion.

Tibial grooves (present/absent).

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