

IDENTIFICATION KEY TO THE SPECIES OF THE GENUS DINA
R. BLANCHARD, 1892 (EMEND. MANN, 1952)
(HIRUDINEA: ERPODELLIDAE)*

by

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The leech genus *Dina* R. BLANCHARD, belongs to the not too rare genera whose systematic position remains unclear to our very days. Subsequently to the 70 years passed since its establishment, both the rank of the category and its content underwent a number of changes. Today, the majority of authors consider it only as a subgenus of *Erpobdella* DE BLAINVILLE, 1818, while others still regard it as a distinct genus.

When R. BLANCHARD described his genus in 1892, he emphasized, as its essential characteristic, the fact that the median, third annulus (that is, the last or b_0 annulus of the complete somite according to the present usage of defining annulation and segmentation) of the quinqueannulated complete somite is longer and wider than the other four, and that this annulus is divided secondarily by a transversal groove. His generic diagnosis yet contains the followings: the position of the eyes and clitellum is similar to that of the other species of the genus *Erpobdella*, the first five and the last three somites are not complete, and the anus opens in the groove between somites XXIV and XXV, or on somite XXV (the numbering of the somites are, of course, to be understood according to the earlier interpretation). As the typical species of the genus, he designated *Hirudo lineata*, described by O. F. MÜLLER in 1774.

Soon after the description of the genus *Dina*, R. BLANCHARD described another species, by the name *Dina weberi*, from Java, Sumatra and Celebes, in 1897. It appeared later, however, that this taxon can in no way be relegated to this genus, but must be shifted to the genus *Barbronia* JOHANSSON, 1918, (MOORE, 1927).

In 1898 and 1901, our most distinguished and still living leech specialist, J. PERCY MOORE, published the description of two new North American species, named *anocolata* and *microstoma*. Simultaneously with the description of the latter taxon, he relegated the species *Nephelis feroidea*, described by VERRILL

* Dedicated, on the occasion of his 70th birthday, to Academician DR. AMBRUS ÁBRAHÁM, my esteemed and beloved teacher.

in 1874, to the genus *Dina*. MOORE then described, in 1912, another North American taxon of the genus, by the name *parva*, and completing the diagnosis of the genus, characterizes *Dina* as follows: „Size rather small; not greatly depressed posteriorly. Sperm duct not forming a long anterior loop reaching to ganglion XI; atrial cornua small. Last annulus of each complete somite obviously enlarged and subdivided”. This part of the diagnosis, namely that the sperm duct fails to create a long loop reaching to ganglion XI, was the cause of all later complications in the assessment of the genus.

A year later, in 1913, JOHANSSON described, as *Dina absoloni*, a new, eyeless species, on the basis of exemplars collected in various caves in Bosnia and Herzegovina. In the same year, ANNANDALE published a new subspecies of *Dina lineata* O. F. MÜLL., by the name *concolor*, from the Lake Tiberias and the river Jordan.

In 1916, GEDROYĆ described from Poland the species *Dina apathyi*, dedicated to the distinguished Hungarian nerve histologist and hirudinologist. Later, this taxon was considered by PAWLOWSKI (1936) as simply a form of the species *Dina lineata*, having found transitions between the two species as regards both the external morphological characteristics and the formation of the atrium. I had occasion to study and dissect specimens originating from Hungary, and was able to demonstrate that GEDROYĆ's species is a good, distinct taxon. Concerning the results of my studies on this species, I intend to submit a detailed paper on a future occasion.

In 1925, OKA described another species from China, by the name *Dina sinica*. The most striking feature of this species, as for its external morphology, is that its four pairs of eyes are not situated in the way characteristic for the family *Erpobdellidae*, but in the shape of a semicircle or like a horseshoe, — a feature of the family *Hirudidae*. Since I failed to discover, in literature, any reference, completion, or evaluation of this species subsequently to its establishment, and, as the taxon was described merely on the basis of external morphological characteristics, it is far from impossible that the species ought to be removed not only from the genus but also from the order *Pharyngobdellae*, and to be replaced into the order *Gnathobdellae*. Namely, we are incognizant as to its pharyngeal structure, alimentary tract, and the formation of its genital structure, information necessary for the deciding of this problem. In the same year, AUGENER described a new form, by the name var. *arnoldi*, of *Dina lineata* O. F. MÜLL., on the basis of specimens collected in karst-spring in Bulgaria.

In 1927, JOHANSSON described, on the basis of Spanish exemplars, two new varieties of *Dina lineata* O. F. MÜLL., by the names var. *punctata* and var. *notata*. It is readily seen from this and previous papers of the above author, that he, too, had his doubts as to the distinctness of the genus *Dina*. Details in this regard are to be found in PAWLOWSKI's work (1955).

1929, HARANT was the first to use the name *Dina* as a subgenus. Unfortunately, I was unable to acquire HARANT's paper to date, but it appears from PAWLOWSKI's work cited above that HARANT failed to give a satisfactory diagnosis of the subgenus.

In 1930, MOORE describes a species under the name *Dina quaternaria* from China. As an introduction, he writes as follows: „In general external appearance this species resembles *Erpobdella octoculata* (LINN.) JOHANSSON but differs

strikingly both in the position of the gonopores and internally in the form of the atrium". This species does not belong to the genus *Dina* according to MANN (1952) and my own contention, since the last annulus (b_6) of each complete somite is neither enlarged nor subdivided.

In 1935, SCIACCHITANO described a new species by the name *Dina aethiopica* submitting, however, only its size and color. This taxon, represented by a single specimen in the Museum of Tervueren, should be regarded, on the basis of a letter communication of its author agreeing with my contention, as a „species inquirenda”.

The first astonishing fact concerning the genus happened when MOORE dissected, in 1939, *Dina lineata* O. F. MÜLL., specimens received from Morocco. He found, namely, that the genital structure of the typical species designated by R. BLANCHARD of the genus *Dina* R. BLANCHARD, 1892, (emend. MOORE, 1912), fixed by MOORE, does not agree with his (MOORE'S) completary diagnosis.

On the basis of the material of the British Museum, MOORE describes in details in 1944 the species *Dina absoloni* JOHANSSON, whose internal anatomical structure was so far unknown.

It was PAWLOWSKI, the well-known and very thorough hirudinologist, who attempted, in 1948, to extricate the tangled problem of the genera *Erpobdella* and *Dina*. In this work, he analysed in detail the systematical assessment of merely the European species of the genus *Erpobdella*, referring only at the end of the paper to the fact that the species *lineata* O. F. MÜLL. can immediately be separated from all other taxa of the genus by reason of its wider and longer annulus b_6 .

In 1949, MOORE described *Dina bucera*, and in 1951, MOORE and MEYER together, the species *Dina dubia*, from North America. In the wake of the description of this latter species, the authors, aware of PAWLOWSKI'S work (1948), write as follows: „These 2 specimens present a problem. In their technical characters: number and position of eyes, situation of gonopores, annulation, especially the enlargement and subdivision of b_6 of complete somites and as much of the reproductive system as could be determined, they agree with *Dina parva* MOORE, 1912, but they depart widely from that species in the very much larger size and the heavy, spotted pigmentation. In the last two respects they closely resemble *Erpobdella atomaria* (CARENA, 1820) (of HARDING, 1910:180). The latter also has 8 eyes and the gonopores are widely separated by 4 (but not the same) annuli. The species raises again the controversial question of whether the present basis for the separation of *Dina* and *Erpobdella* is justified or should be made along other lines. Of the 6 North American species which have been referred to *Dina*, 4: *D. anoculata* MOORE, 1898, *D. fervida* (VERRILL, 1874) *D. microstoma* MOORE, 1901, and *D. bucera* MOORE, 1949, lack the long preatrial loop of the sperm duct and 2: *D. parva* and *D. dubia* possess it; all have the enlarged and divided b_6 annulus. So far as known all described species of *Erpobdella* possess the preatrial loop with no appreciable enlargement of b_6 . The question seems to be do we have one genus or three? Probably the best current solution would be a compromise: the recognition of one genus with three subgenera”.

In 1952, MANN, in his paper „A revision of the British leeches of the family *Erpobdellidae*, with a description of *Dina lineata* (O. F. MÜLLER, 1774),

a leech new to British fauna", gives the following characterization of the genus *Dina* R. BLANCHARD:

„Complete somites made up of five annuli, of which the last is larger than the others, and is subdivided by a shallow furrow (fig. 11) [$b_1 = b_2 = a_2 = b_3 < (c_{11} + c_{12})$].

Eyes typically as in *Erpobdella* but with a marked tendency to variation in number and arrangement. Vasa deferentia may, or may not, form long preatrial loops; atrium deeply cleft, prostate cornua simply curved, but not spirally coiled. Geno-type *Hirudo lineata* O. F. MÜLLER, 1774."

For my part, I wholly concur with this characterization of the genus, and use it below in the same interpretation.

In 1953, MOORE, aside of the description of two new species belonging to another genus, submitted also a new, more detailed diagnosis of his species *bucera*, described only by its essential characteristics in 1949. It is incomprehensible why he lists the date of the original description as 1947 (!) (p. 9, 11) instead of 1949.

The sections of the papers cited above of MOORE and MEYER (1951) and of MANN (1952) incited PAWLOWSKI to take up the problem again. In his thorough work published in 1955, he proposed that the leeches referred to the genera *Erpobdella* DE BLAINVILLE (= *Herpobdella* AGASSIZ) and *Dina* R. BLANCHARD (emend MOORE) be united, with the three following subgenera, in the genus *Erpobdella* DE BLAINVILLE, to wit:

1. subgenus: *Erpobdella* PAWLOWSKI, 1955 (annuli of complete somites equally long, preatrial loop of vasa deferentia extending anteriorly to ganglion XI). Subgenero-type: *Erpobdella* (*Erpobdella*) *octocolata* L. Species: *nigricollis* (BRANDES), *testacea* (SAVIGNY), *punctata* (LEIDY) MOORE, and *monostriata* (GEDROYĆ) PAWLOWSKI.

2. subgenus: *Dina* HARANT, 1929 (annulus b_6 wider and longer than other ones of somite, subdivided into two secondary annuli by transversal furrow. Subdivision not complete; formula of annulus b_6 : $(c_{11} + c_{12})$. Vasa deferentia forming a large loop anteriorly of atrial cornua, extending to ganglion XI). Subgenero-type: *Erpobdella* (*Dina*) *lineata* O. F. MÜLLER. Species: *lineata* f. *apathyi* GEDROYĆ, *lineata* subsp. *concolor* ANNANDALE, *dubia* MOORE and MEYER, *absoloni* JOHANSSON.

3. subgenus: *Mooreobdella* PAWLOWSKI, 1955 (annulus b_6 longer than other ones of somite, subdivided into two secondary annuli by transversal furrow. Subdivision incomplete, formula of annulus b_6 : $(c_{11} + c_{12})$. Vasa deferentia not forming a preatrial loop, but extending posteriorly from atrial cornua). Subgenero-type: *Erpobdella* (*Mooreobdella*) *fervida* (VERRILL) MOORE. Species: *microstoma* MOORE, *bucera* MOORE.

PAWLOWSKI failed to relegate (probably inadvertently) the species *parva* MOORE into any of the three subgenera; nor does he mention *sinica* OKA (This latter case may also hinge on the fact that he was not aware of informations or publications known to me, and hence omits the taxon from his work).

The youngest species of the genus is *Herpobdella* (*Dina*) *stschegolewi* LUKIN and EPSTEIN, described in 1960, on the basis of specimens collected in the southern part of the Crimean Peninsula. The species is closely related to *Dina apathyi* (GEDR.) PAWL., differing from it only by reason of its alleged size and the number of light spots on the annuli. Accordingly to my present investigations, there is an essential difference between the two species also in regard of the

size and development of the ovisacs. LUKIN, in his monography (1962) on the leeches of Ukraine, does not recognize the genus *Dina* as even a subgenus, treating all listed (8) *Erpobdella* and *Dina* species in the genus *Herpobdella*.

The key of identification submitted below is in the nature of an experimental summary. The compilation is based partly on the results of material dissected, partly on literature. I am aware of the numerous errors contained therein, but these cannot, due to the lack of research material or literature unavailable to me, be corrected or substituted from my part at present. Other workers could, however, by examining species that were never in my hands, correct it here and there, or even entirely recast it on the basis of fresh points of view. I think, however, that despite its shortcomings, it is still the first identification key for the several species of the genus *Dina*.

- 1 (4) Eyes absent.
- 2 (3) Ground color of specimens preserved in alcohol dull yellowish, immaculate below and on margins, but largely replaced above by four longitudinal stripes of grayish or dull black, of which outer pair submarginal, duller in color, and narrower than more distinct inner pair, well separated by a median stripe of ground color. Genital pores separated by two annuli; male pore in furrow XIb_6/XIb_1 , female pore in furrow $XIIb_2/a_2$. Annulation: Somites I-IV:1, V-VI:3, VII-XXIV:5, XXV:3, XXVI-XXVII:1 (2). Three annuli behind anus. Reproductive system hitherto unknown. In waters above ground. Length: 10-15 mm. Width: 3-4 mm. — U. S. A.

anocolata MOORE, 1898

- 3 (2) Color of live animal opaque white, aqueous, intransparent, with some pinkish tint resulting from showing through of cutaneous blood vessels. Genital pores separated by three annuli; male pore in furrow $XIIb_1/b_2$, female pore in furrow $XIIb_5/b_6$. Annulation: Somites I-IV:1, V:2, VI:3, VII-XXIV:5, XXV:4 (3), XXVI-XXVII:2. Four annuli behind anus. The atrium is of the typical *Erpobdella* type with the cornu directed forward and continued by atrial loops of the vasa deferentia as far as ganglion XI. In waters in caves. Length: 20-40 mm. Width: 4-6 mm. — Yugoslavia

absoloni JOHANSSON, 1913

- 4 (1) Eyes present.
- 5 (10) Dark ground color of dorsal side ornamented by lighter spots arranged per annuli. Sperm duct forming long preatrial loop, extending to ganglion XI.
- 6 (7) Genital pores separated generally by three and one-half annuli; male on $XIIa_2$ female in furrow $XIIb_1/b_2$. Color light brown above with a dark brown or blackish median dorsal stripe visible in cephalic half, fading out posteriorly; thickly spotted with pale yellow or white in irregular transverse rows. Four pairs of eyes: two pairs of labials on III and two pairs of smaller buccals on sides of V. Annulation: Somites I-II:1, III:2, IV-VI:3, VII-XXIV:5, XXV-XXVII:2 (3). Two or three annuli behind anus. Atrium with median chamber wider than long, large cornua directed forward and curved ventrad with sperm duct

attached to apex and forming a simple loop reaching ganglion XI; epididymis or spermatic vesicles confined to somites XIV, XV and XVI; testisacs larger and fewer than in most related species, 7–8 pairs per somite. Length: about 50 mm. Width: 2.5–3.5 mm. — Canada

dubia MOORE and MEYER, 1951

- 7 (6) Genital pores separated generally by two annuli. No distinct, dark, median dorsal stripe, or at most an indistinct median line in posterior half of body.
- 8 (9) On dark ground color of dorsal side, 10–12 light, yellowish spots transversally per annuli. In arrangement of spots, a tendency to form two rows discernible, especially striking on wider annulus b_6 . Ovisacs extremely well developed, sacculiform, considerably extending posteriorad, over seven somites, from XIV to end of XIX. Ground color deep olive green of a grayish shade. Anterior part of body and caudal sucker visibly lighter than other parts of body. On greater, posterior part of body, sometimes a narrow, median, dark line (not stripe!). Eyes typical: four pairs; two pairs of labials on II and two pairs of buccals on V. Reduction of eyes not rare. Annulation: hitherto unknown; according to authors of description, agreeing with that of *lineata* O. F. MÜLL. Male gonopore situated in furrow $XIIb_2/a_2$, female gonopore in furrow $XIIb_5/b_6$, or rarely on b_6 . Atrium with great median chamber, slightly wider than long, cornua narrow, curved, apically inflected (beak-shaped). Length: 25–75 mm. Width: 3–8 mm. — Soviet Union (Crimean Peninsula)

stschegolewi LUKIN and EPSTEIN, 1960

- 9 (8) On dark ground color of dorsal side, only 7–9 light, yellowish spots transversally per annuli. Ovisacs developed, forming a number of loops, extending through four somites, from XIV to end of XVII. Color dark brown or slate-gray, without any longitudinal stripes or lines. Situation of eyes as in former species. Annulation: I-IV:1, V:2, VI:3, VII-XIV:5, XXV:3, XXVI-XXVII:2. Male genital pore situated in furrow $XIIb_2/a_2$, female gonopore in furrow $XIIb_5/b_6$. Atrium of medium size, cornua narrow, relatively short, extending almost parallel anteriorad, strongly deflected toward abdominal side. Length: 20–70 mm. Width: 3–8 mm. — Poland, Ukraine, Hungary, ? Italy
- apathyi** GEDROYĆ, 1916
- 10 (5) Dark ground color of dorsal side without either regularly or irregularly arranged lighter spots per annuli. Color unicolorous, or with longitudinal stripes, but never spotted.
- 11 (14) Three pairs of eyes. Sperm duct lacking preatrial loop and ending abruptly at atrium.
- 12 (13) Genital pores separated by three annuli. Male gonopore situated, as usual, at $XIIb_2/a_2$, female at $XII/XIII$. A larger species. Color light yellowish or light grayish, unpigmented. First pair of eyes on III, second and third pairs on IV. Annulation: I-III:1, IV-V:2, VI:3, VII:4, VIII-XXIII:5, XXIV:4, XXV:4(3), XXVI-XXVII:2. Two annuli behind anus. Median chamber of atrium relatively large and without

median groove; prostate cornua inconspicuous, shorter than diameter of median chamber. Epididymis confined to somites XVI, XVII and XVIII. A great number of testes in somites XVIII-XXIII, but their numbers so far not determined. Ovisacs reaching backwards nearly to end of somite XVI. Length: 30-50 mm. Width: 2.5-3.5 mm. — U. S. A.

microstoma MOORE, 1901

- 13 (12) Genital pores separated by two annuli. Male gonopore usually on $XIIa_2$, female on $XIIb_6$, but both may be in following furrows: $XIIa_2/b_5$, and $XII/XIII$. A smaller species. Color of preserved specimens somewhat dusky, but no pigment or pattern except in eyes; in life probably reddish from cutaneous blood vessels. One pair of eyes of large labials on III, two pairs of small buccals on sides of IV. Annulation: I:1, II-III:2, IV:3, V-VII:?, VIII-XXIV:5, XXV-XXVI:3, XXVII:1 (2). Atrium globoid, not deeply incised dorsally for nerve cord, atrial cornua large and conspicuous, their length definitely exceeding diameter of atrium, simply curved and directed laterad and somewhat cephalad. Testes small and numerous, about 60 on each sides in somites XVIII to XXII. Length: 10-20 mm. Width: 1.5-4 mm. — U. S. A.

bucera MOORE, 1949

- 14 (11) Four pairs of eyes. Sperm duct may, or may not, form long preatrial loops.
- 15 (16) Four pairs of eyes situated in a semicircle or in a horseshoe shape, as on species belonging to family *Hirudidae*. First and second pairs of eyes situated in a crescent on II, third pair on IVb_1 , fourth pair on IVa_2 . Unicolorous pale grayish, no stripes or pattern. Annulation: I-III:1, IV-V:2, VI:3, VII:4, VIII-XXIV:5, XXV:4, XXVI-XXVII:2. Three annuli behind anus. Genital pores separated by two and one-half annuli. Male pore situated on $XIIb_2$, female pore in furrow $XIIb_5/b_6$. Structure of reproductive organ so far unknown. Length: about 30 mm. Width: about 4 mm. — China

sinica OKA, 1925

- 16 (15) Four pairs of eyes situated as characteristic of *Erpobdellidae*, that is, two pairs on labial, two pairs on buccal annuli.
- 17 (18) Genital pores separated usually by three and one-half annuli. Male pore situated on $XIIa_2$ (rarely in furrow $XIIa_2/b_5$), female pore in furrow $XIIIb_1/b_2$. Color unknown, that is, whatever pigment present in live specimens, faded out completely in preserved material. Anterior eyes larger than posterior ones, two pairs almost in contact and their pigment cups situated well within somite III; posterior eyes smaller, looking outwards and backwards from lateral sides of posterior part of IV. Annulation: I-II:1, III-V:2, VI:3, VII:4, VIII-XXIV:5, XXV:4, XXVI:3, XXVII:2. Two or three annuli behind anus. Atrium with simply curved cornua. Epididymis confined to somites XIV, XV, and XVI. Length: 25-40 mm. Width: ? — U. S. A.

parva MOORE, 1912

- 18 (17) Genital pores separated usually by two, or two and one-half (rarely three) annuli.

- 19 (20) Sperm duct lacking anterior loop and ending abruptly at atrium. Ovisacs reaching backwards to end of somite XVIII. Genital pores separated by two annuli. Male pore in furrow $XIIb_2/a_2$, female pore in furrow $XIIb_5/b_6$. Color varying: either lacking pigment entirely and pale red with darker cloudings, or with two, narrower or broader, dark longitudinal stripes extending over body, including always a light median stripe. Generally 4 pairs of eyes, but frequently only 3 pairs. Annulation: so far unknown. Median chamber of atrium of medium size and not deeply cleft, cornua prominent. Length: 40–60 mm. Width: 4–6 mm. — North America

fervida (VERRILL, 1874)

- 20 (19) Sperm duct forming simple loops extending forward to ganglion XI. Ovisacs reaching backwards only to end of somite XV. Genital pores separated usually by two and one-half annuli. Male pore in furrow $XIIb_2/a_2$, or half a ring on either side of that position, female pore on $XIIb_6$. Color dark reddish brown, paler beneath, often with two pairs of longitudinal black stripes in paramedian and supramarginal lines. Eyes typically four pairs, two pairs of labials on II and two pairs of buccals on V, but this arrangement variable. Annulation: I-IV:1, V:2, VI:3, VII-XXIV:5, XXV:3, XXVI-XXVII:2. Atrium with median chamber about as long as broad, cornua large, slightly curved ventrally. Length: 60–80 mm. Width: 4–6 mm. — Holarctic Region (= *Nepheleis quadristriata* GRUBE, 1850, *Nepheleis mexicana*, DUGÈS, 1876, *Nepheleis grandis* APÁTHY, 1888, *Nepheleis gallica* BLANCHARD, 1892, *Dina blasei* BLANCHARD, 1892, *Nepheleis bistriata* BRANDES, 1900)

lineata (O. F. MÜLLER, 1774)

Variation:

subsp. **concolor** ANNANDALE, 1913

var. **punctata** JOHANSSON, 1927

var. **notata** JOHANSSON, 1927

Species inquirenda:

Dina aethiopica SCIACCHITANO, 1935: Sanguisughe del Congo Belge (Rev. Zool. Bot. Afr., 26 (4), p. 458).

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* The originals of the papers designated with an asteric were unattainable to me.