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An Additional Note on *Dugesia guatemalensis* MITCHELL et KAWAKATSU (Turbellaria, Tricladida, Paludicola), a Troglophilic Planarian from México

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Abstract An additional description of the Mexican troglophilic planarian, *Dugesia guatemalensis* MITCHELL et KAWAKATSU, 1973, from the Ojo de Agua de Olla de Nubes, Tamaulipas, is given in the present paper. The differential diagnosis of the species is corrected.

Since our earlier paper on the cave-planarian fauna of the Sierra de Guatemala (MITCHELL & KAWAKATSU, 1973), we have acquired a collection of *Dugesia guatemalensis* from a small spring, Ojo de Agua de Olla de Nubes, in the Sierra de Guatemala. The opening of the spring is more like a small cave, although total darkness cannot be reached. Planarians were collected in the deep shade of this opening. We here present a discussion of the specimens from this spring to augment our original description of this troglophilic species, which is otherwise known with certainty only from the type-locality, La Cueva de las Perlas, Municipio de Juamave, Tamaulipas, México.

Specimens examined were fixed in Bouin's fluid. Serial sagittal sections (7–8 micrometers) were stained with Delafield's hematoxylin and erythrosin. The numbers designating each sample are those employed by KAWAKATSU in his permanent recording system.

We wish to thank Dr. Roman KENK, U. S. National Museum of Natural History, Smithsonian Institution, for his reading of this manuscript; Dr. Barbara WARBURTON for the collection of *D. guatemalensis* from the Ojo de Agua de Olla de Nubes; and Dr. Marie M. JENKINS, formerly of Madison College, Virginia, for consultation.

Order TRICLADIDA
Suborder PALUDICOLA or PROBURSALIA
Family Dugesiidae BALL, 1974
Genus *Dugesia* GIRARD, 1850

Dugesia guatemalensis MITCHELL et KAWAKATSU, 1973

The principal literature for this species is MITCHELL and KAWAKATSU (1973).

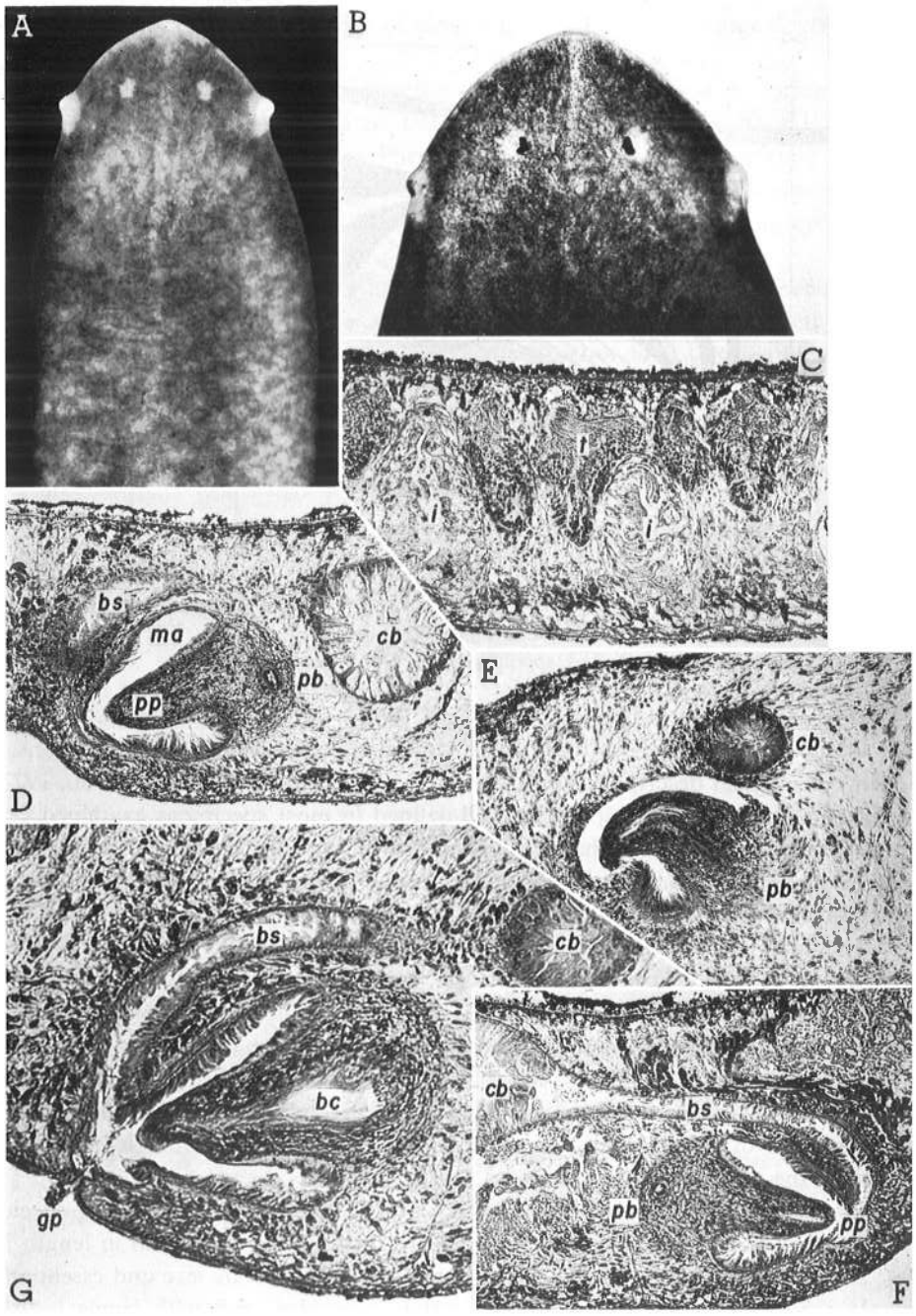
External features. The largest specimen is 15 mm long by 3 mm wide. The tip of the head is pointed, and the eyes are small and surrounded by conspicuous pigment-free areas (Fig. 1A and B). These features of *D. guatemalensis* differ somewhat from those of *Dugesia dorotocephala* (WOODWORTH, 1897), in which the tip of the head is more blunt and the eyes slightly larger, observations confirmed by Dr. JENKINS (personal communication). The auricles are large, pointed, and white, and the color of the dorsum is dark brown with (in some specimens) a light, midlongitudinal stripe conspicuous at the anterior one-half of the body. The anterior tip of the head, body margin, and areas above the pharynx and copulatory apparatus are lighter in color. The nerve cords are visible as a pair of inconspicuous longitudinal lines. The uniformly pigmented pharynx is inserted at approximately midbody. In fully mature specimens, the spermiducal vesicles appear as a pair of opaque, white structures lying on either side of the midline between the mouth and copulatory apparatus.

Internal features. Inner pharyngeal musculature is typical of the family Dugesiidae. The outer pharyngeal musculature consists of two layers, a thinner one of longitudinal fibers situated beneath the outer ciliated epithelium and a thicker layer of circular fibers beneath the longitudinal ones. In having a two-layered outer pharyngeal musculature, *D. guatemalensis* is similar to *Dugesia tigrina* (GIRARD, 1850) and different from *D. dorotocephala*.[1)]

The testes are well developed, of moderate size, numerous, occupy the dorsal part of the mesenchyme just beneath the epithelium (Fig. 1C), and are arranged on either side of the midline in two to three longitudinal zones extending from the posterior level of the ovaries almost to the posterior end of the body. Many testes of large size extend farther ventrally between the intestinal diverticula. Total testicular number is 200 to 300. Spermiducal vesicles are conspicuously packed

1) A more detailed description of the comparative pharynx histology of *Dugesia* species will be found in a paper by KAWAKATSU and MITCHELL (1981).

Fig. 1. *Dugesia guatemalensis* MITCHELL et KAWAKATSU, 1973; preserved specimens and sagittal sections of specimens from the Ojo de Agua de Olla de Nubes, Tamaulipas, México. —— A, Dorsal view, anterior; B, head, from whole mount (No. 1114 k); C, sagittal section of prepharyngeal region (No. 1114 h); D, sagittal section of copulatory apparatus (No. 1114 a); E, sagittal section of copulatory apparatus (No. 1114 c); F, sagittal section of copulatory apparatus (1114 f); G, sagittal section of copulatory apparatus (1114 h). bc, bulbar cavity; bs, bursa stalk; cb, copulatory bursa; gp, genital pore; i, intestine; ma, male antrum; pb, penis bulb; pp, penis papilla; t, testis.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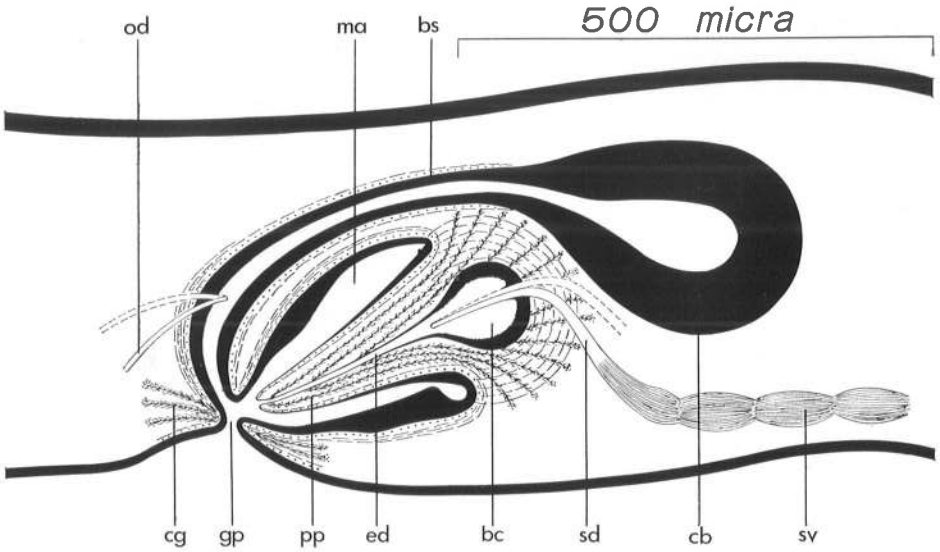

Fig. 2. *Dugesia guatemalensis* MITCHELL et KAWAKATSU, 1973; sagittal view of the copulatory apparatus (No. 1114 a). bc, bulbar cavity; bs, bursa stalk; cb, copulatory bursa; cg, cement gland; ed, ejaculatory duct; gp, genital pore; ma, male antrum; od, ovovitelline duct; pp, penis papilla; sd, sperm duct; sv, spermiducal vesicle.

with sperms. The ovaries and numerous yolk glands are in their usual positions.

In our original description of this species, we (MITCHELL & KAWAKATSU, 1973) stated that "the testes, not altogether well-defined in most specimens examined, . . . are essentially ventral" and that "the usual spermiducal vesicles . . . were not conspicuous." Perhaps this was due to the degree of maturity of the male genital organs in the specimens of the type-series.

A sagittal view of the copulatory apparatus of *D. guatemalensis* from the Ojo de Agua de Olla de Nubes is shown in Fig. 2, and pertinent photomicrographs of the apparatus are shown in Fig. 1 (D–G). The size of the copulatory apparatus is slightly larger in these specimens than in those from the type-locality, and the bulbar cavity is more rounded. The epithelium of the penis lumen (bulbar cavity and ejaculatory duct) in specimens from both the localities has insunk nuclei. Other features of the copulatory apparatus of specimens from both localities are essentially the same.

Correction of the differential diagnosis. Troglophilic or spring-dwelling species with pigment and two small eyes; size small to medium (10 to 15 mm in length in life); auricles of moderate length; testes numerous, of moderate size and essentially dorsal; penis bulb well developed, moderately muscular, and with single bulbar cavity; sperm ducts opening into seminal vesicle separately at basal part of the penis lumen; penis papilla symmetrical, conical, long, pointed, and with narrow

ejaculatory duct; copulatory bursa of moderate size; two ovovitelline ducts entering bursal stalk separately.

Specimens examined. Specimen Lot No. 1114, from a small spring, Ojo de Agua de Olla de Nubes, Sierra de Guatemala, Municipio de Gómez Farías, approximately 12 km. NW Gómez Farías, Tamaulipas, México; altitude approximately 1,555 m. Collected by Dr. B. WARBURTON, 6 August 1971; 11 specimens fixed in Bouin's fluid. MITCHELL and KAWAKATSU visited this spring on 10 January 1971 but found no planarians.

Deposition of material. Two sets of serial sagittal sections (Specimen No. 1114a, 1114h) were deposited in the Division of Worms, U.S. National Museum of Natural History, Smithsonian Institution, Washington, D.C. Remaining material was retained in the authors' laboratories.

Postscript

Since this paper was submitted for publication, it has been pointed out to the authors by Dr. KENK that *D. guatemalensis* appears to be very close to *D. arizonensis* KENK, 1975, in having dorsal testes, an elongated penis papilla, and a simple penis lumen. *D. guatemalensis* can be distinguished from *D. arizonensis* by the course of the sperm ducts and the lack of a distinct common genital antrum. In *D. arizonensis* the sperm ducts recurve before entering the penis bulb, and there is a conspicuous common antrum. The distance between the type-localities of these two species is approximately 1,300 km.

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