

## TERRESTRIAL TURBELLARIANS (TRICLADIDA: BIPALIIDAE) AS PSEUDOPARASITES OF MAN

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**ABSTRACT:** A living terrestrial planarian, *Bipalium fuscatum*, was coughed up by a child in Chiba Prefecture, Japan. Severe coughing and respiratory difficulties during the preceding 4 days suggest the worm had been present in the respiratory tract for that period. A related species, *B. venosum*, had previously been reported by a Japanese physician in Kyushu to have been passed during defecation by a woman hospitalized for rectal bleeding. No explanation is available as to how the worms were acquired. In Atlanta, Georgia, a *B. kewense* was encountered in the diaper of an infant, which appeared to have been passed with the stool. These cases suggest that these free-living flatworms will invade body openings and can survive for some days as pseudoparasites.

Standard texts on parasitology treat only two of the classes of the Phylum Platyhelminthes, the Trematoda and Cestoda. The third class, the Turbellaria, comprising primarily free-living forms, has been almost entirely ignored by medical parasitologists and physicians. The terrestrial turbellarians are nocturnal predators in humid environments. This report describes our experiences, and that of a colleague in Kyushu, Japan, which have led us to believe that several species of one widely distributed genus of terrestrial planarians can be pseudoparasites and possibly produce lesions in man.

### Case report No. 1

In October 1970, an 18-month-old boy in Choja, Misaki-machi, Chiba Prefecture, Japan, coughed up a 10-cm-long flatworm which was alive and actively moving. During the preceding 4 days, the child had intermittent severe coughing spells and frequent episodes of respiratory difficulty. Since these signs ceased completely immediately after elimination of the worm, it is presumed that it had been present in the respiratory tract, probably in the nasopharynx, for this period, and was responsible for the difficulty.

The worm was not recognized by the family physician, nor by the staff at a local health center, so it was killed and fixed in 70% alcohol and referred to Chiba University for identification. Upon examination, it was determined to be a terrestrial planarian, *Bipalium* sp.

Initially only a generic identification was made and we were not aware that several temperate-zone

species of *Bipalium* occur in Japan, since the genus is primarily tropical. Because it is common in Malaysia and Indonesia, and known to be transported frequently in association with imported orchids and other tropical plants, a similar source was suspected as the origin of the planarian in this case. However, a visit to the patient's home revealed that there were no tropical plants in the home or vicinity, and that the child had not visited elsewhere for several months prior to the episode. Questioning of the family and neighbors revealed that several persons had seen similar worms inside houses in the vicinity, particularly in the bathrooms. A search for further specimens yielded three more worms of the same genus within a few days, and it became obvious that it was established in this area. However, the circumstances and means of entry through the child's mouth or nares could not be determined.

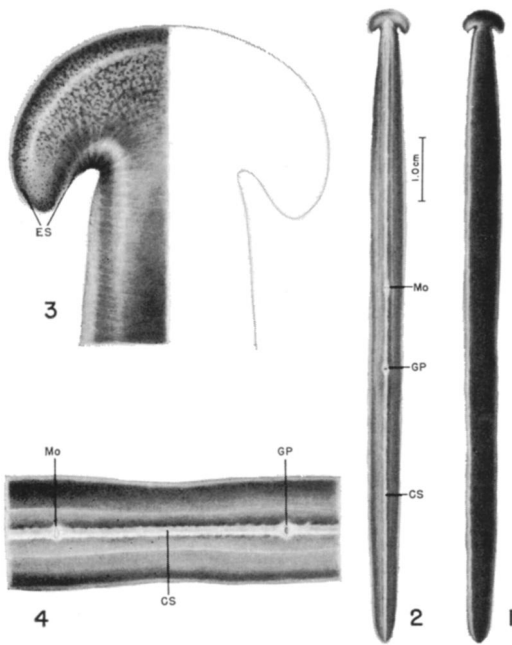
The worm in alcohol was approximately 10 cm in length and 6 mm at its greatest width. The principal morphologic features are shown by the drawings (Figs. 1-4). Comparison with the descriptions in Kaburaki's monograph (1922) of Japanese species revealed that it closely resembled *B. fuscatum* Stimpson, 1857, and it was tentatively identified as this species. It was noted that our specimen had fewer eyespots than the drawing by Kaburaki, and they were confined to the margins of the head, whereas his figure indicates distribution onto the margins of the neck. However, the original description by Stimpson (1857) stated, "Ocelli in marginibus capitis sparsi."

### Case report No. 2

An 83-year-old woman in Kyushu, Japan, was being treated for rectal bleeding of 5 years' duration, which the attending physician attributed to amebic dysentery. On 9 October 1968, the patient developed perforative peritonitis and a vaginal fistula. On 6 December, a very active, blood-covered flatworm, approximately 6 cm in length, was passed during defecation. Subsequent to passing the worm, bleeding ceased. However, the

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FIGURES 1-4. Drawings of a preserved specimen of *Bipalium fuscatum*. 1. Entire worm, ventral. 2. Entire worm, dorsal. 3. Dorsal view of head. 4. Ventral view of central region. Abbreviations: Mo, mouth; GP, genital pore; CS, creeping sole; ES, eyespots.

patient expired 26 February and no autopsy was performed.

The worm was described by Prof. Okabe (1969, and pers. comm.) as being 61 mm in length in formalin, but later shrank to 53 mm in alcohol. This specimen was tentatively identified as *B. venosum* Kaburaki, 1922, by Dr. Masaharu Kawakatsu of Sapporo Fuji Women's Junior College.

### Case report No. 3

In July 1961, a diaper with a fresh stool containing an active flatworm was brought to the 3rd U. S. Army Medical Laboratory from the pediatric clinic of the Ft. McPherson Army Hospital in Atlanta, Georgia. The worm had been brought in by the mother of a 10-month-old infant, who said that it passed with the stool. The child had not been ill, and since the worm was recognized as a land planarian and the child had been playing on the lawn outdoors, it was assumed that the worm had merely crawled into the diaper. This opinion was expressed to the mother, but she was adamant that it had been passed by the child, since she had changed the diaper only minutes before.

The turbellarian was considerably smaller than the size range reported by Hyman (1951) but it otherwise matched the description of *B. kewense*

Mosely, 1878, and this identification was confirmed by the U. S. National Museum.

### DISCUSSION

The immediate cessation of coughing and respiratory distress after expulsion of the worm by the 18-month-old child strongly indicates a cause-and-effect relationship. It is unfortunate that the patient was too young to describe his apparent discomfort. The copious quantities of slime produced by terrestrial planarians in the process of locomotion would probably cause much discomfort in the respiratory passages. A specimen of approximately the same size produced over 3 ml of slime when confined in a vial for 8 hr. It is likely that this extremely viscous substance could have caused the respiratory difficulty. Nasal leeches, *Limnatis nilotica* in N. Africa and the Near East and *Dinobdella ferox* in Asia, of a similar size or even larger, have been reported to remain undetected in the nasopharynx of humans except for the hemorrhage they caused.

The circumstances under which invasion of the human body could occur can only be a matter of speculation at this time. However, in view of the normal habitat of these creatures, it is not difficult to imagine how a displaced worm, in search of a warm, moist, dark refuge, would react to the nares of a sleeping person. The three worms collected later in the vicinity of the child's home were very motile. The distance necessary to pass from the nostril into the nasopharynx could be traversed in as little as 3 to 5 sec.

Bipaliid planarians are basically tropical forms, and the autochthonous species of temperate-zone Japan seem to be unique exceptions. It is of interest that a parallel example exists in the Asian terrestrial leeches of the family *Haemadipsidae* which also has one non-tropical species, which is found only in Japan. However, in spite of their tropical origins, species of *Bipalium* have achieved wide distribution through dissemination with shipments of tropical plants, particularly orchids. They are commonly encountered in greenhouses throughout the world, and have become established out-of-doors in many areas with mild climates. It is possible that cases of pseudo-parasitism by these forms may not be as rare

as might be deduced from the absence of such reports.

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#### RESEARCH NOTE . . .

### A Rapid Staining Method for Microfilariae

The traditional diagnostic procedure in canine filarial infections for detection and measurement of the microfilariae is often not sufficient for the identification of the microfilariae occurring in the blood of these animals in Africa. The modified Knott-test (methylene blue stain) and the thin blood smear stained with Giemsa (Jackson, 1969, J. Am. Vet. Med. As. **154**: 374) do not reveal the criteria necessary to differentiate the microfilariae of the different *Dirofilaria* spp. and *Dipetalonema* spp.

Other criteria like the R-cell pattern and structures like the nerve ring and the cephalic hook are considered quite helpful in making a relevant identification. Sawyer (1965, Proc. Helm. Soc. Wash. **32**: 15) mentioned the advantages of staining the microfilariae with brilliant cresyl blue. To make this method more suitable for routine laboratory use, we introduced the following simplification, based on the method used for the counting of reticulocytes (Sandoz SA, 1950, Planches d'Hématologie):

a. *Preparation of the stained slide*: A drop of 1% ethyl-alcoholic solution of brilliant cresyl blue is placed on a glass slide and spread

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in the same manner that a thin blood film is made. This film is allowed to dry and is ready for use; more slides can be made at the same time and stored for later use.

b. *Microfilariae*: One drop of sediment from a blood sample hemolyzed with saponine is placed on the stained slide (see a.), covered with a cover slip, and sealed with vaseline. The microfilariae stretch, and die within 2 to 5 min. They can be examined during the next 6 hr, after which time they absorb too much stain to permit a close examination of the internal structure.

The microfilariae show a light blue color in which the nearly unstained R cells can easily be detected. The cephalic hook, if present, is lightly visible.

The advantages of this method when compared with the modified Knott-test and the Giemsa-stained thin smear are the ease and speed of performance, plus the ready identification of the R-cell pattern and the possible cephalic hooks.

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