

**A TRICHOSTRONGYLOID NEMATODE,
MACKERRASTRONGYLUS BIAKENSIS, NEW SPECIES, FROM
ECHYMIPERA KALUBU (MARSUPIALIA: PERORYCTIDAE)
OF IRIAN JAYA, INDONESIA**

Endang Purwaningsih and Hideo Hasegawa

ABSTRACT. - *Mackerrastrongylus biakensis*, new species (Nematoda: Trichostrongyloidea: Mackerrastrongylidae) from the intestine of *Echymipera kalubu* in Irian Jaya, Indonesia, is described. This species is clearly distinguished from other members of the genus *Mackerrastrongylus* by having longer spicules, divided distally into two branches, and very small extradorsal rays. This is the first record of *Mackerrastrongylus* outside of Australia.

KEY WORDS. - Nematoda, *Mackerrastrongylus*, new species, *Echymipera kalubu*, Marsupialia, Peroryctidae.

INTRODUCTION

Echymipera kalubu is found in Irian (= New Guinea) and its adjacent islands (Veevers, 1978). It is considered that the ancestor of this bandicoot migrated from Australia to Irian when the both areas were connected with each other by a land bridge (Petocz, 1994). During a survey on biodiversity held in January 1995, *E. kalubu* was captured and examined for parasite. A species of nematode recovered from its intestine has proven new to science as described herein.

METHODS

The host, *Echymipera kalubu*, was captured using a live trap. It was killed with ether, and its viscera were examined for parasites. Nematodes were fixed and preserved in 70% alcohol, cleared in glycerine-alcohol solution, and mounted in glycerine for microscopical

Endang Purwaningsih - Zoological Division of Research & Development Centre for Biology, Indonesian Institute of Sciences, Jl. Ir. H. Juanda 9, Bogor 16122, Indonesia. **Hideo Hasegawa** - Department of Biology, Oita Medical University, Hasama, Oita 879-55, Japan.

examination. The synlophe or external sculpturing was observed by making cross sections. Figures were made with the aid of a drawing tube. Measurements are given in micrometres unless otherwise stated, for the holotype male and allotype female, being followed in parentheses by the range for paratypes. The type specimens are deposited in the Bogor Zoological Museum, Indonesia, MZBNa 282A for holotype and allotype and MZBNa 282B for paratypes.

SYSTEMATICS

Mackerrastrongylus biakensis, new species

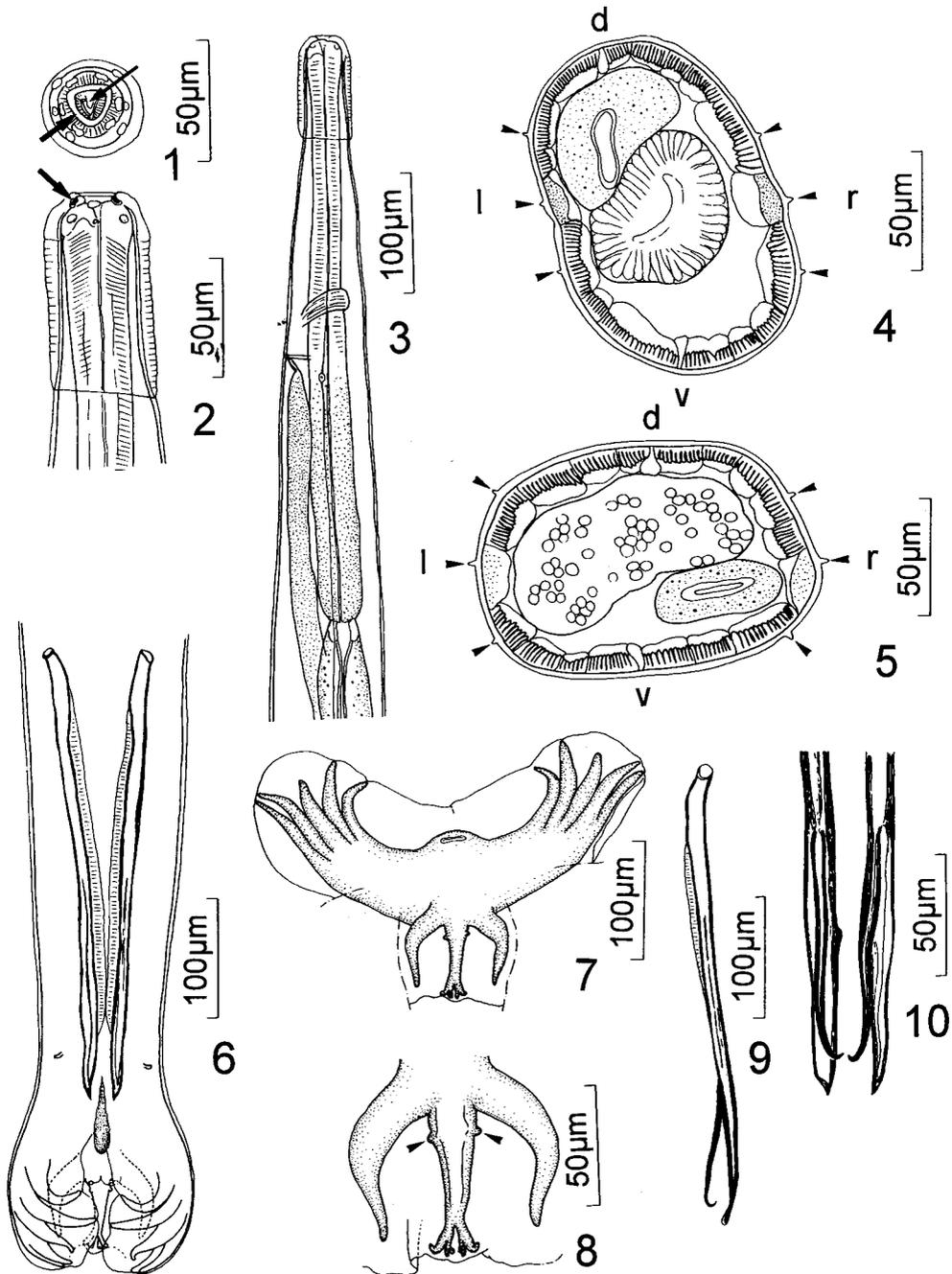
(Figs. 1-14)

Material examined. - Holotype male, allotype female, 3 paratype males, 3 paratype females.

General description. - Body filiform, tapering to anterior extremity. Cephalic vesicle present (Figs. 1, 3). Mouth triangular (Fig. 1). Sclerotized buccal ring present (Figs. 1, 2). Dorsal esophageal tooth present (Fig. 1). Four cephalic papillae, 2 amphidial pores and six labial papillae present (Fig. 1). Cuticle with fine transverse striations. Synlophe with 2 lateral and 4 sublateral ridges perpendicular to body wall, and commencing slightly posterior to cephalic vesicle and ending at a level anterior to spicules in male and posterior to vulva in female (Figs. 4, 5). Esophagus club-shaped (Fig. 3). Nerve ring in midesophageal level (Fig. 3). Cervical groove present on ventral side at a level slightly posterior to nerve ring, and with excretory pore opening into it (Fig. 3). Cervical papillae minute, at level slightly posterior to excretory pore (Fig. 3).

MALE. - Length 6.45 (6.98-7.28) mm and width in midbody 140 (129-176). Cephalic vesicle 86 (81-90) long. Nerve ring, excretory pore and cervical papillae 221 (230-246), 266 (266-301), and 275 (278-306) from cephalic extremity, respectively. Esophagus 486 (448-464) long and 45 (49-51) wide at thickest portion near posterior end. Prebursal papillae minute, at level anterior to gubernaculum (Fig. 6). Bursa copulatrix symmetrical (Fig. 7). Bursal rays except externolateral and externodorsal rays terminating near bursal rim (Fig. 7). Ventral rays divergent from each other distally. Externolateral ray shorter than and divergent from other laterals. Mediolateral and posterolateral rays almost same size, running together along whole length (Fig. 7). Externodorsal rays thick, arising from base of dorsal ray. Dorsal ray divided at distal 1/4 into 2 branches, each branch divided again into 2 unequal offshoots distally, and each of inner offshoots bifid apically (Figs. 7, 8). Extradorsal rays minute, at base of dorsal ray (Figs. 7, 8). Spicules strongly sclerotized, brown in color, with ala, divided apically into thick ventral and curved dorsal branches, 429 (378-410) long (Figs. 6, 9, 10). Gubernaculum widened posteriorly in dorso ventral view, 56 (51-54) long (Fig. 6).

FEMALE. - Length 10.80 (9.95-11.18) mm and width in midbody 258 (253). Cephalic vesicle 86 (90-93) long. Nerve ring, excretory pore and cervical papillae 253 (240-266), 298 (282-300), and 306 (282-304) from cephalic extremity, respectively. Posterior lip of vulva much protruded in two specimens. Amphidelphic. Vagina vera short, vestibule swollen medially, filled with eggs and debris, sphincter thick-walled and infundibulum cylindrical (Fig. 11). Measurements of reproductive organs in one female as follows: vagina vera 54 long, vestibule 223 long, anterior sphincter 45 long, posterior sphincter 43 long, anterior infundibulum 164 long and posterior infundibulum 135 long (Fig. 11). Caudal extremity with 2 triangular ventrolateral cuticular projections and caudal spike of 16 (16-19) long



Figs. 1-10. Male of *Mackerrastrongylus biakensis*, new species. 1. Cephalic extremity of male, showing dorsal esophageal tooth (long arrow) and buccal ring (short arrow), apical view. 2. Cephalic extremity, showing buccal ring (arrow), left lateral view. 3. Anterior portion, left lateral view. 4. Cross section at level between anterior and middle one-third, showing cuticular ridges (arrowheads). 5. Cross section through midbody, showing cuticular ridges (arrowheads). 6. Posterior portion, ventral view. 7. Bursa copulatrix, broken, ventral view. 8. Dorsal portion of bursa copulatrix, showing extradorsal rays (arrowheads), ventral view. 9. Spicule, right lateral view. 10. Distal ends of spicules, dorsal view. Abbreviations: d, dorsal; l, left; r, right; v, ventral.

(Figs. 12, 13). Eggs ellipsoidal, thin shelled, containing early cleavage-stage embryos, 58 (54-64) by 36 (34-38) (Fig. 14).

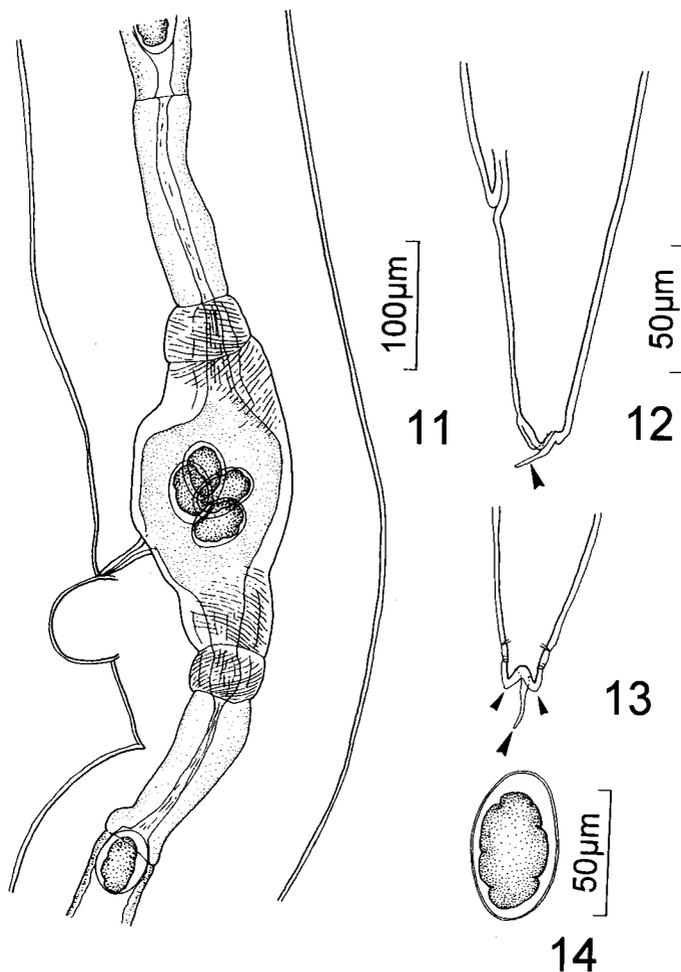
Type host. - *Echymipera kalubu* (Fischer, 1829) (Marsupialia: Paramelomorpha: Peroryctidae).

Site. - Intestine.

Locality. - Biak Island, Irian Jaya, Indonesia.

Etymology. - This species is named after the type locality, Biak.

Remarks. - This species has been known only from the type locality.



Figs. 11-14. Female of *Mackerrastrongylus biakensis*, new species. 11. Vulval region, left lateral view. 12 and 13. Posterior extremity, left lateral (12) and ventral (13) views, showing caudal spike (large arrowheads) and ventrolateral cuticular projections (small arrowheads). 14. Egg.

DISCUSSION

The present species belongs to the genus *Mackerrastrongylus* Mawson, 1960, that has been recorded only from the marsupials of the order Peramelemorphia, by having a buccal ring, a pair of extradorsal rays, a dorsal esophageal tooth and a cervical groove (Durette-Desset, 1983). Four species have been described in this genus: *M. peramelis* (Johnston & Mawson, 1938), *M. waringi* Inglis, 1968, *M. mawsonae* Inglis, 1968, and *M. isoodon* Durette-Desset & Cassone, 1980, all from Australia (Mawson, 1960; Inglis, 1968; Durette-Desset & Cassone, 1980). However, *M. waringi* was transferred to the genus *Sprattellus* Durette-Desset & Cassone, 1980 (Durette-Desset & Cassone, 1980). As in the present species, the extradorsal rays are minute in *M. peramelis* and *M. mawsonae*, whereas those in *M. isoodon* are rather developed (Inglis, 1968; Durette-Desset & Cassone, 1980). In *M. mawsonae*, the externodorsal rays are short and do not extend far beyond the midlevel of dorsal ray, but those in *M. peramelis* extend beyond the distal end of dorsal ray; meanwhile, they are of intermediate length in *M. isoodon* and the present species (Inglis, 1968; Durette-Desset & Cassone, 1980). The spicules in the hitherto known species are split into three branches distally, and are much shorter than those in the present species: spicule length (in micrometers) / male body length (in mm) are 240 / 6 in *M. peramelis*; 165 / 5.4 in *M. isoodon*; 200-230 / 5.14-6.34 in *M. mawsonae* (Inglis, 1968; Durette-Desset & Cassone, 1980). *Mackerrastrongylus peramelis* and *M. isoodon* have more than 6 ridges at level of midbody in male (Durette-Desset & Cassone, 1980), whereas the synopse of *M. mawsonae* has not been described. By these morphological features, the present species is readily distinguished from the other members of the genus *Mackerrastrongylus*.

Evolution of the subfamily Mackerrastrongylinae has occurred closely with that in marsupial hosts because all of the members hitherto known are parasitic in peramelemorphs and dasyuomorphs of Australia (Durette-Desset, 1983, 1985). Irian and Australia were connected to each other by a land bridge in the Pleistocene (Petocz, 1994) and belong to the same zoogeographical region. Therefore, the presence of *Mackerrastrongylus* in the Irian peramelemorphs is not unexpected. Apparently, *M. biakensis* has derived from a common ancestor with Australian representatives. It is also highly probable that more *Mackerrastrongylus* species parasitize Irian and Seram peramelemorphs other than the present host. Further parasitological research of these marsupials living outside of Australia is necessary to clarify species composition and the speciation process of the genus *Mackerrastrongylus*, and also to elucidate the host-parasite coevolutionary relationships in the Irian-Australian area.

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LITERATURE CITED

- Durette-Desset, M.C., 1983. Keys to genera of the superfamily Trichostrongyloidea. In: Anderson, R.C. & A.G. Chabaud (eds.) *CIH Keys to the Nematode Parasites of Vertebrates. No 10*. Pp. 1-86. Commonwealth Agricultural Bureaux, Farnham Royal, Buckinghamshire.
- Durette-Desset, M.C., 1985. Trichostrongyloid nematodes and their vertebrate host: reconstruction of the phylogeny of a parasitic group. *Adv. Parasitol.* **24**: 239-300.
- Durette Desset, M.C. & J. Cassone. 1980. *Mackerrastrongylus* Mawson, 1960, et *Spratetellus* n. gen. (Nematoda, Trichostrongyloidea) parasites de Perameloidea et Dasyuroidea (Marsupiaux australiens). *Bull. Mus. Natn. Hist. nat.*, Paris, 4 e sér. 2. Section A, no. **4**: 943-954.
- Inglis, G., 1968. The geographical and evolutionary relationships of Australian trichostrongyloid parasites and their host. *J. Linn. Soc. (Zool)*. **47**, **312**: 327-347.
- Mawson, P.M., 1960. Nematode belonging to the Trichostrongylidae, Subuluridae, Rhabdiasidae, and Trichuridae from bandicoots. *Aust. J. Zool.* **8**: 261-284.
- Petocz, R., 1994. *Mamalia Darat Irian Jaya*. Gramedia, Jakarta. 163 pp.
- Veevers, C.W., 1978. *Mamalia Darat Indonesia*. Intermedia, Jakarta, 111 pp.

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