

A NOTE ON AN INTRODUCED SPECIES OF FRESHWATER
PLANARIAN, *DUGESIA AUSTRASIATICA* KAWAKATSU, 1985,
COLLECTED FROM CULTURE PONDS OF *TIRAPIA*
MOSSAMBICA IN SAGA CITY, KYÛSHÛ, JAPAN
(Turbellaria, Tricladida, Paludicola)¹⁾

by

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INTRODUCTION

In the summer of 1984, TAKAI had a chance to collect a number of specimens of freshwater planaria, attached to roots of water hyacinth (*Eichhornia crassipes*) grown in outdoor culture ponds for *Tilapia mossambica*, at the Furukawa Hatchery, Hasuike-chô, Saga City. This is a large hatchery and several kinds of aquatic fishes (tilapia, golden fish, killifish, etc.) are cultivated. In warm seasons, they kept in outdoor ponds; in winter they transferred into large aquaria in vinyl houses kept over 15°C.

Live specimens of samples cultured in TAKAI's laboratory (water temp., 20-30°C) produced a large population. For the identification of this species, both live and preserved specimens were sent to KAWAKATSU. Although only a single sexually mature specimen was found in the material, the species was identified as *Dugesia austroasiatica* KAWAKATSU, 1985, based upon the examination of serial sections. A preliminary chromosomal examination of *D. austroasiatica* from the Saga population had been made by TAKAI and AOYAGI. Then, OKI and TAMURA, who received live specimens from the Saga population, also studied the animal karyologically.

The results of our morphological and karyological examinations on *D. austroasiatica* will be given in the present paper, together with some considerations about the possible routes of introduction of this species into Japan.

LOCALITY, MATERIAL AND METHODS

The locality where the Saga population of *Dugesia austroasiatica* was first collected is shown in Figure 1 (A-D). Photographs of live and preserved specimens of planaria are also shown in Figure 2 (A-G). For taxonomic study, specimens preserved with Bouin's fluid (KAWAKATSU's Specimen Lot No. 1813) and with a 70% solution of ethanol (Lot No. 1814) were used. Serial sagittal sections (7-8 micrometers) were stained with Delafield's hematoxylin and erythrosin. Chromosomes were observed by a squash method (cf. OKI, TAMURA & KAWAKATSU, 1976; and others).

1) Part of this study was presented at the 57th Annual Meeting of the Zoological Society of Japan held in Fukuoka, on October 10-12, 1986 (cf. TAKAI, AOYAGI, OKI, TAMURA & KAWAKATSU, 1986).

OBSERVATIONS

Order TRICLADIDA

Suborder PALUDICOLA or PROBURSALIA

Family Dugesiiidae BALL, 1974

Genus *Dugesia* GIRARD, 1850

Dugesia austroasiatica KAWAKATSU, 1985

Morphological:

The living specimens from the Saga population measure 10 to 12 mm in length and 1.5 to 2 mm in width. The single, sexually mature specimen examined by KAWAKATSU was 10 mm long and 2 mm wide after fixed with Bouin's fluid. The external appearance of live specimens is the same as that of the specimens from the Nigata population described in the previous paper (cf. KAWAKATSU, OKI, TAMURA & YAMAYOSHI, 1985, p. 3, fig. 1 A and B). The "neck" is not conspicuous in large specimens. The distance between two eyes, each surrounded by a narrow, non-pigmented area, is about one-third the width of the head at the level of eyes (Fig. 2 A-C). In small specimens, it is slightly narrower than one-third the width of the head.

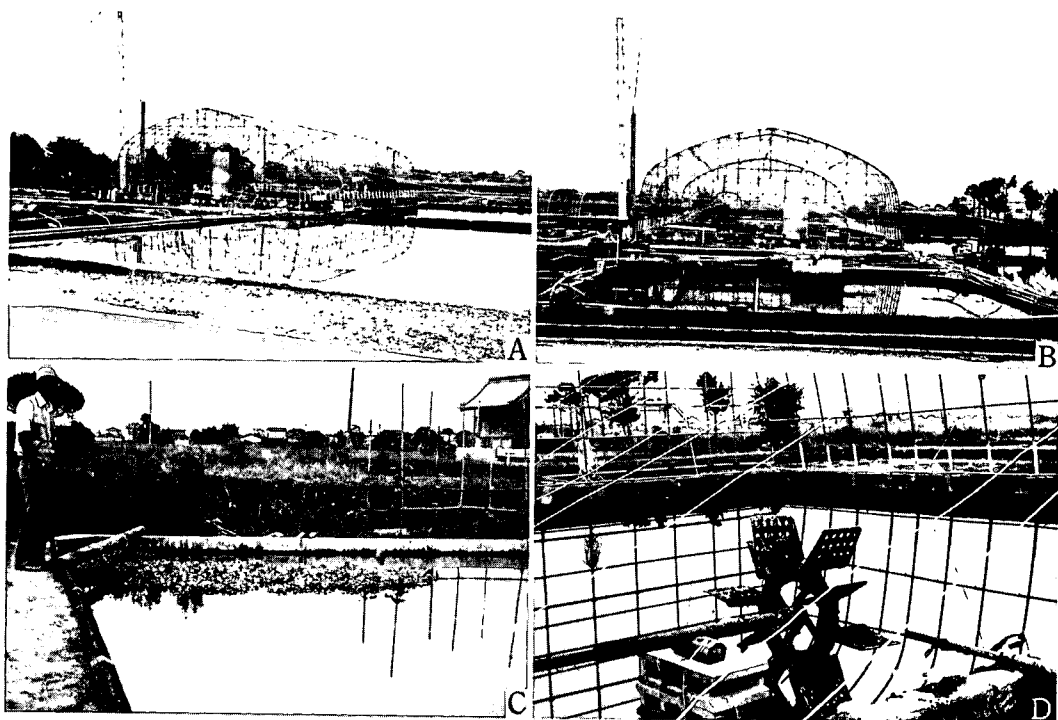


Fig. 1. Photographs showing habitats of *Dugesia austroasiatica* in Saga City, Kyûshû, Japan. A and B: general views of the Furukawa Hatchery, Hasuike-chô, Saga. The main structure is a vinyl house. C: a part of outdoor culture pond for subtropical fishes. Notice a colony of water hyacinth. D: a part of culture pond in the vinyl house.

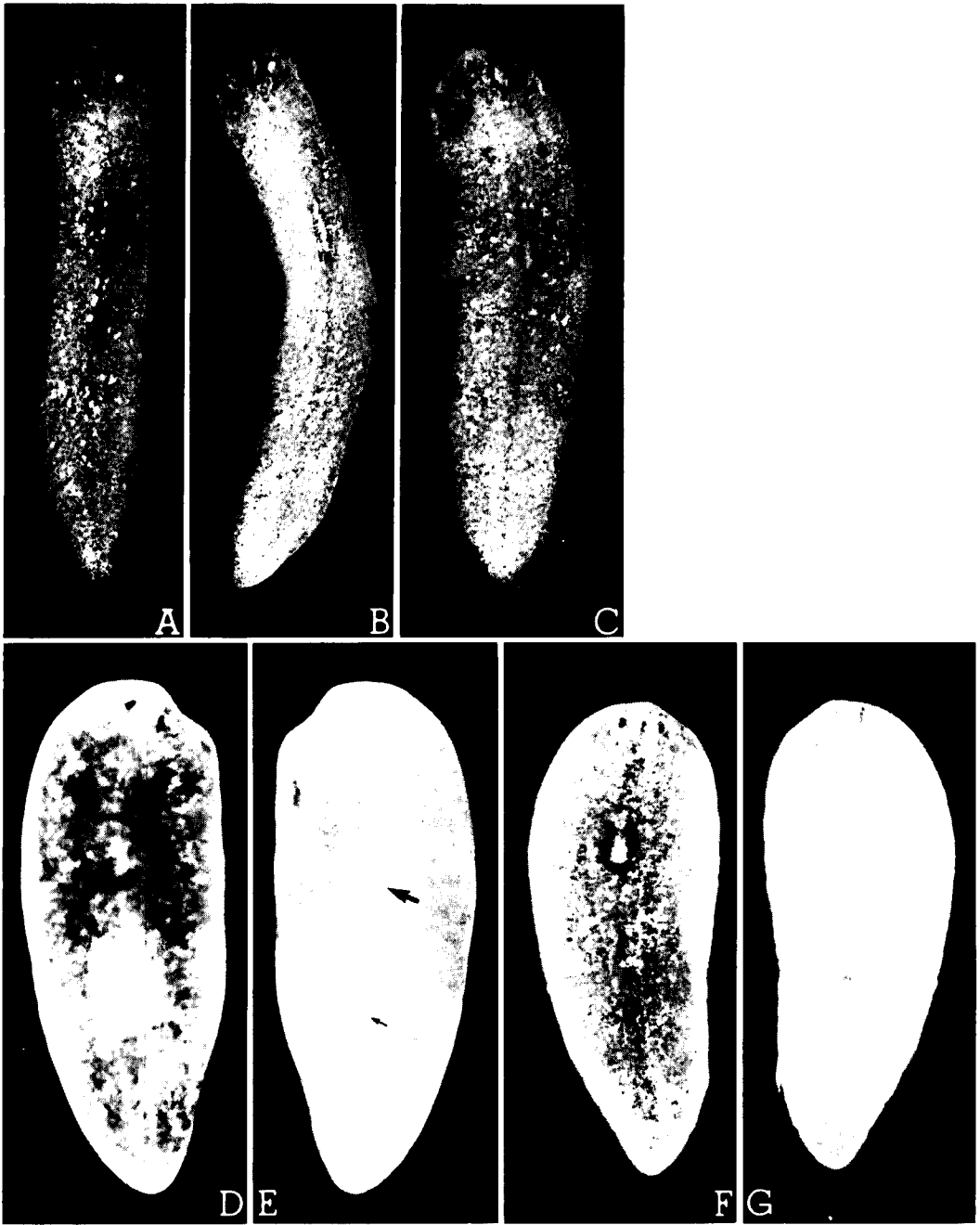


Fig. 2. *Dugesia austroasiatica*, photographs of live and preserved specimens. A-C: two specimens. A and B are the same specimen. D-G: two preserved specimens (Specimen Lot No. 1813). E and G are ventral views of the specimens D and F, respectively. Large arrow indicates the mouth; small arrow, the genital pore.

The ground color of the dorsal surface of the body is rather dark brown with numerous, small, whitish spots and blackish pigments. There is a pair of conspicuous auricular sensory organs. In some specimens examined, indistinct sensory spots can be seen on the anteroventral surface of the head.

The short pharynx is inserted anterior to the middle of the body (Fig. 2 A-C). The external musculature of the pharynx consists of an outer, thin layer of longitudinal fibers and an inner, thin layer of circular ones.

The dorsal testes are conspicuous in Specimen No. 1813-o. A pair of large ovaries occurs in the usual ventral position.

A sagittal view of the copulatory apparatus of the specimen from the Saga population is shown in Figure 3. Photomicrographs in Figure 4 (A-C) show the parts of the copulatory apparatus of the same specimen. Anatomically, the shape of the copulatory apparatus of the specimen from the Saga population (Figs. 3, 4 A-C) shows great resemblance to one of the figures of the specimen from the Niigata population (cf. KAWAKATSU, OKI, TAMURA & YAMAYOSHI, 1985, p. 6, fig. 3, B; No. 796-a).

Material. One set of serial sagittal sections of the sexually mature specimen (No. 1813-o) and several sets of sections of non-sexual specimens (Nos. 1813 and 1814) are retained in KAWAKATSU's laboratory of Fuji Women's College, Sapporo, Japan.

Karyological:

The result of cytological study of animals from the Saga population is shown in Table 1. The idiograms of 2 specimens are shown in Figure 5; photomicrographs of the chromosomes of them are also shown in Figure 6 (A and B).

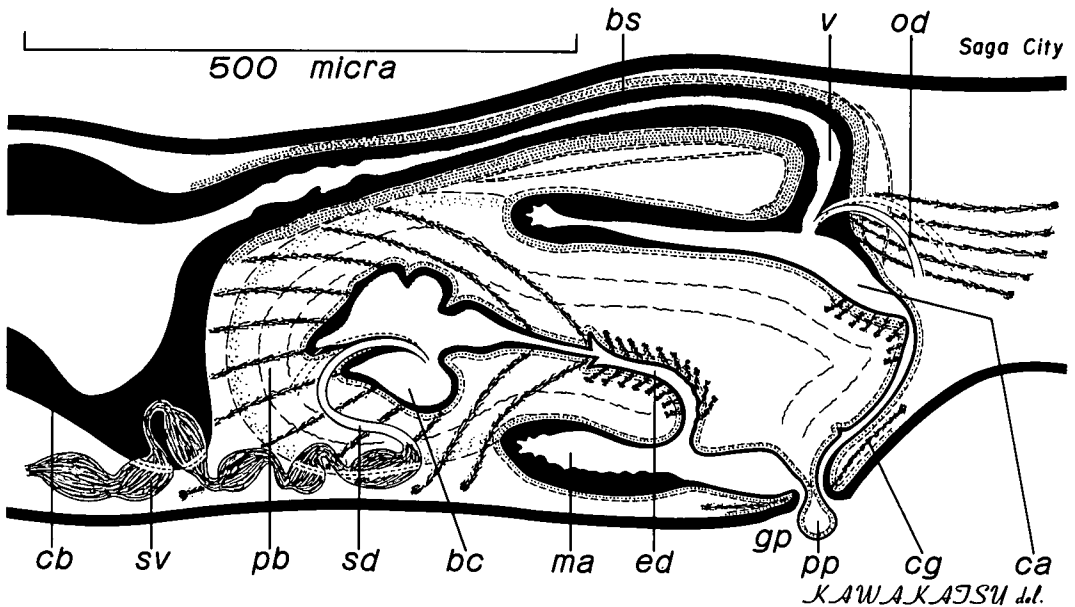


Fig. 3. *Dugesia austroasiatica*, semidiagrammatic sagittal view of the copulatory apparatus (No. 1813-o). bc, bulbar cavity; bs, bursal stalk; cb, copulatory bursa; cg, cement gland; ed, ejaculatory duct; gp, getital pore; ma, male genital antrum; od, ovovitelline duct; pb, penis bulb; pp, penis papilla; sd, sperm duct; sv, spermiducal vesicle; v, vagina.

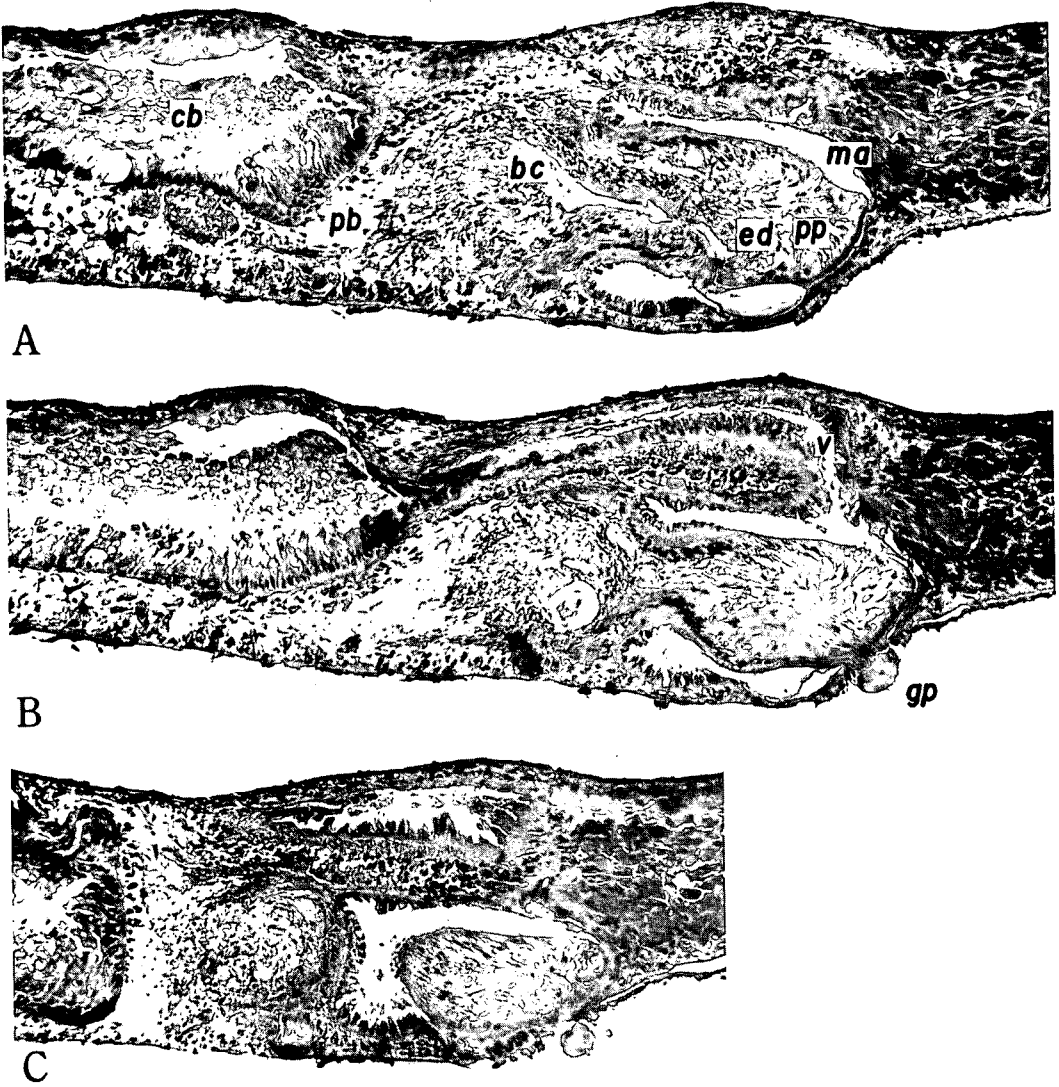


Fig. 4. *Dugesia austroasiatica*, photomicrographs of sagittal sections of Specimen No. 1813-o. bc, bulbar cavity; cb, copulatory bursa; ed, ejaculatory duct; gp, genital pore; ma, male genital antrum; pb, penis bulb; pp, penis papilla; v, vagina.

Table 1. Karyotype of *Dugesia austroasiatica* from the Saga population.

No. of specimens examined cytologically			Chromosome nos. & the no. of cells studied		Karyotype
Total	Sexual	Asexual	Meiosis	Mitosis	
3	0	3	—	16 (132)	2x

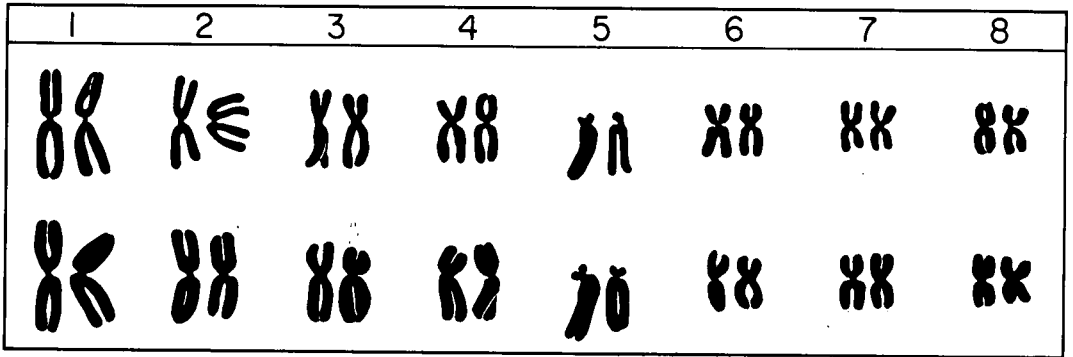


Fig. 5. Idiograms of *Dugesia austroasiatica*, $2x = 16$. Each idiogram was drawn from cells of different specimens.

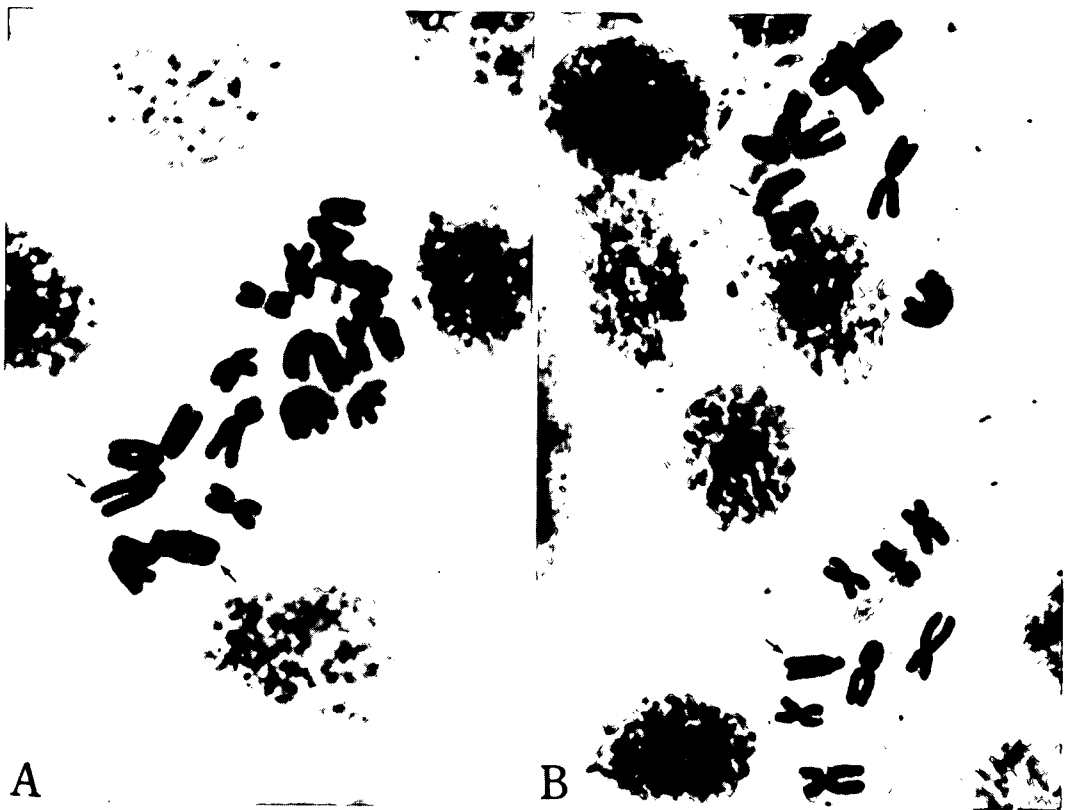


Fig. 6. Photomicrographs of the chromosomes of *Dugesia austroasiatica*, $2x = 16$. A and B were taken from cells of different specimens. Small arrows indicate the subtelocentric chromosomes.

The chromosome number of the diploid cells is $2x = 16$. The karyotype consists of 7 pairs of meta- or submetacentric chromosomes in descending order of size and one pair of subtelocentric chromosomes (the 5th chromosome set).

REMARKS

As was already reported in the previous paper (cf. KAWAKATSU, OKI, TAMURA & YAMAYOSHI, 1985), *Dugesia austroasiatica* is undoubtedly a species introduced into Japan from some of Southeast Asiatic countries. Externally, the species is similar to *Dugesia siamana* KAWAKATSU, 1980, from Thailand, and *Dugesia tamilensis* KAWAKATSU, 1980, and *Dugesia bengalensis* KAWAKATSU, 1983, from India. From the result of the karyological study of *D. austroasiatica* reported in the present paper (it was not studied in the original description of this species), the karyotype of this species is also similar to that of the species mentioned above.

The similarity of both external appearance and karyotype between *D. austroasiatica* and *Dugesia* sp. (species of Taiwan; cf. KAWAKATSU, OKI, TAMURA, YAMAYOSHI, LUE & HAGIYA, 1979, pp. 79–83, figs. 10-12) is also conspicuous. Dr. LUE expressed an opinion in his 1981 paper that *Dugesia* sp. (species of Taiwan) may be identical with *Dugesia japonica japonica* ICHIKAWA et KAWAKATSU, 1964, based upon his biochemical study of material from 5 localities in northern area of Taiwan (cf. WANG, WU & LUE, 1981). Although the taxonomic position of *Dugesia* sp. (species of Taiwan) is not determined yet, its karyotype is quite different from that of *D. j. japonica*. It is possible that *Dugesia* sp. from Taiwan is identical with *D. austroasiatica*. Dr. LUE's electrophoretic analysis of two enzymes, esterase and malate dehydrogenase, seems to be insufficient for the taxonomic separation of different *Dugesia* species.

Tilapia mossambica was introduced into several Asiatic countries from Africa in the late 1930's. Its young was at first introduced into Japan from Thailand and Taiwan in 1954. Although it is not a commercial fish in Japan, it is now cultivated in several fisheries and ponds fed by warm waters throughout the year in Japan (the Izu Peninsula in Central Japan, the vicinities of hot springs around Mt. Daisetu-zan in Hokkaidô in North Japan, etc.). *D. austroasiatica* may have been introduced into culture ponds of semitropical fishes in Japan with some of the aquatic plants. The Furukawa Hatchery introduced young *T. mossambica* from some importers of young fishes located in Shiga Prefecture in Central Japan. It is highly probable that *D. austroasiatica* occurs in these kinds of culture ponds for subtropical, aquatic fishes now under cultivation in Japan.

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SUMMARY

Dugesia austroasiatica KAWAKATSU, 1985, was collected from culture ponds of a subtropical fish (*Tilapia mossambica*) in Saga City, Kyûshû, Japan. This is the third record of occurrence of this species in Japan. The diploid karyotype consists of 7 pairs of meta- or submetacentric chromosomes and one pair of subtelocentric ones ($2x = 16$).

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