

*Haemogregarina shirikenimori* n. sp.  
(Protozoa : Haemogregarinidae) Detected  
from *Triturus pyrrhogaster ensicauda* (Hallowell, 1860)  
(Amphibia : Salamandridae) in Okinawa Island

Akira MIYATA

*Department of Epidemiology, Institute for Tropical Medicine,  
Nagasaki University*

**Abstract:** *Haemogregarina shirikenimori* n. sp. from *Triturus pyrrhogaster ensicauda* (Hallowell, 1860) was described. The intraerythrocytic parasites in the peripheral blood are banana-shaped, measuring about 13 by 3.5 microns, and being enclosed in a clear capsule with a membrane. Hypertrophy of the host cell is not observed. Two types of schizont are also seen in the erythrocyte of the peripheral blood. In Type 1 of the schizont (about 20 by 10 microns), the maximum number of nuclei is 16. This type of schizont produces micromerozoites (length about 10 microns). In Type 2, the schizont is larger than that of Type 1, and macromerozoites (length about 20 microns) are produced. The most suspicious vector of this haemogregarine is the land leech, *Haemadipsa zeylanica japonica*.

Pearse (1932) had examined the blood smears gathered from about three hundreds of *Triturus pyrrhogaster pyrrhogaster* (Boie, 1826), which distributes to the main islands of Japan (Kyushu, Shikoku and Honshu), but he did not found haemogregarine. In Ryukyu Islands, another subspecies of the newt, *Triturus pyrrhogaster ensicauda* (Hallowell, 1860) distributes. The present author had an opportunity to examine this newt (*ensicauda*) in northern part of Okinawa Island, from June to July, 1976, and he found two species of haemoprotozoa. In the separate paper of this issue, the author have described a new species of trypanosome, *Trypanosoma ogawai* n. sp. (Miyata, 1977), and in the present paper the author described the second species as *Haemogregarina shirikenimori* n. sp. which was named after Japanese name of *Triturus pyrrhogaster ensicauda*. The meaning of "shiriken-imori" is just same as "ensicauda-newt."

*Haemogregarina shirikenimori* n. sp.  
(Figs. 1-3)

The morphological features of the haemogregarine described below are based on the

Giemsa stained smears.

The parasites in the peripheral blood are usually intraerythrocytic as shown in Figs. 1-3, but the parasite is rarely seen in a leucocyte (Fig. 1, e, and Fig. 2, d) or extracellularly (Fig. 1, g). The parasite in the host cell is usually enclosed in a clear cyst or a capsule with a limiting membrane, but in immature parasites (Fig. 1, o, and Fig. 2, f, right), no space or membrane can be seen between parasite and host cell. Hypertrophy and any other visible effect to the host cell or the host cell nucleus are not observed even in the multiple infection cases (Fig. 1, d, and i, and Fig. 2, c), except for the infection of schizonts.

Gametocytes: Most of the parasites seen in the blood smear are so-called gametocytes (for example, Fig. 2, b-c). The gametocyte is banana-shaped or sausage-shaped parasite in outline, measuring about 13 by 3.5 microns. The nucleus of the gametocyte is irregular but compact in shape and dark purple in colour. The gametocytes curve the body in the capsule (Fig. 1, b, and Fig. 2, e), but the parasite is seen as elongate vermicular form (Fig. 1, g) when escaped from the host cell. The size of some gametocytes (Fig. 2, f, middle) is apparently larger than that of above mentioned parasites (Fig. 2, c). The nucleus of the former is a large dispersed mass, but that of the latter is a compact mass.

Schizogony: Two types of schizogony are found in the erythrocyte of the peripheral blood. Type 1: Most of schizonts detected produce micromerozoites (Fig. 1, h-n, and Fig. 3, g-k). In this type, the size of schizont is about 20 by 10 microns, and between immature and mature schizonts, there is no difference in their sizes. The maximum number of nuclei in the mature schizont is 16 (Fig. 1, m), but 3 to 6 merozoites sometimes seen in mature schizont (Fig. 3, i-j). The length of micromerozoite is about 10 microns, and the parasite shown in Fig. 1, o, may be derived from this type of merozoite. Type 2: The schizont shown in Fig. 3, l, produced three macromerozoites, which are very different from micromerozoites. The length of macromerozoite is about 20 microns. Unfortunately this type of schizont could not be detected except this only one case.

Type smears: Holotype and paratype smears are in the collection of the author in the Department of Epidemiology, Institute for Tropical Medicine, Nagasaki University. Two paratype smears will be deposited in the collection of the Wellcome Museum of Medical Science, London.

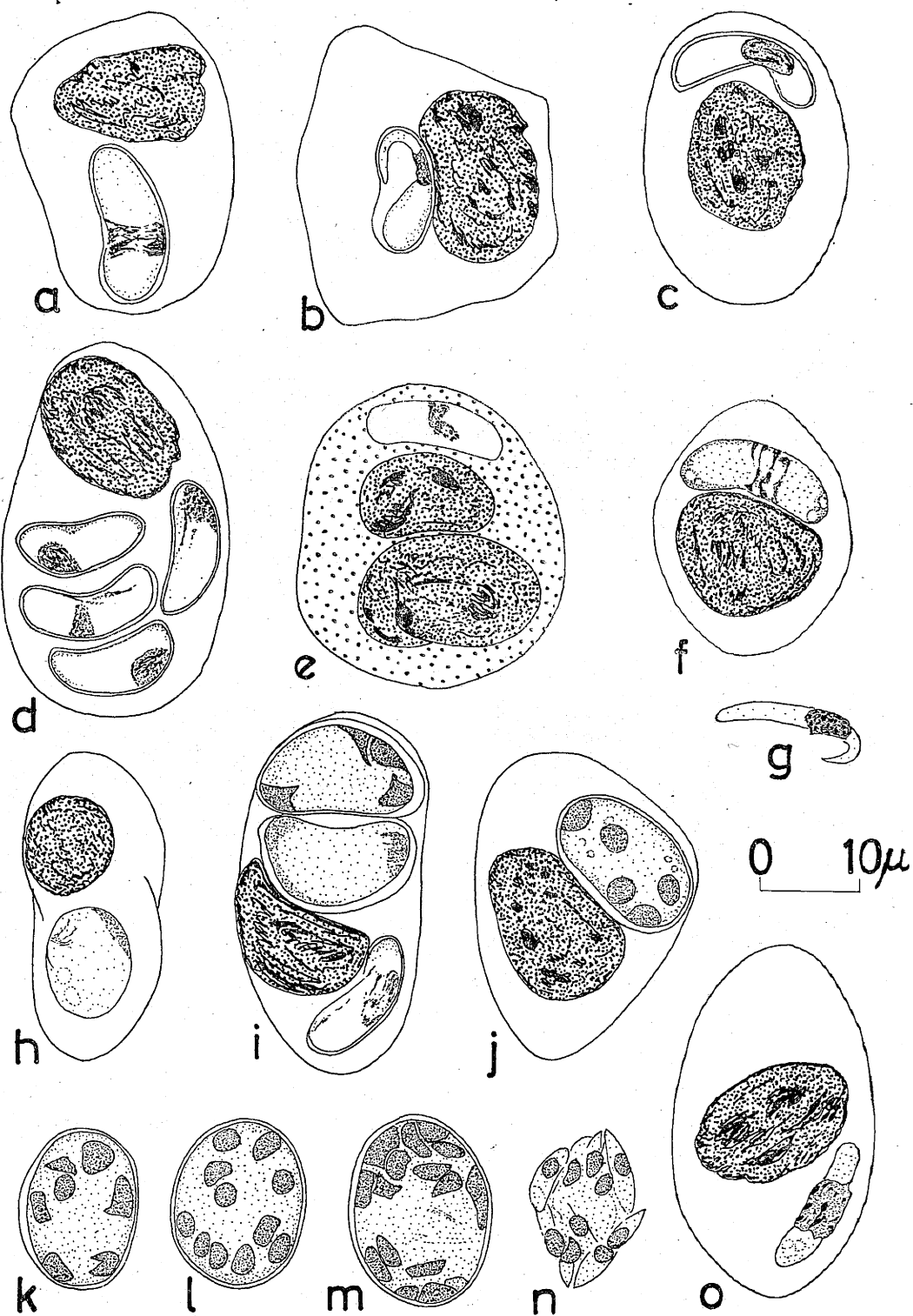
Type host: *Triturus pyrrhogaster ensicauda* (Hallowell, 1860) (Amphibia: Salamandridae).

Type locality: Yona, Kunigami-son, northern part of Okinawa Island, Japan. The details of the type locality and survey method will be described in a separate paper by Miyata, Miyagi, and Tsukamoto (1977). From June to July, 1976, this parasite was detected from 61 (86%) out of 71 newts examined.

Vector: The natural invertebrate host of this haemogregarine is not known, but the land

Fig. 1. *Haemogregarina shirikenimori* n. sp.

- a-d, f. parasites in the erythrocyte of host animal.
- e. parasite in the leucocyte.
- h-n. schizonts in the erythrocyte. k-m. host cell not shown.
- g. exoerythrocytic parasite (gametocyte).
- o. young parasite.



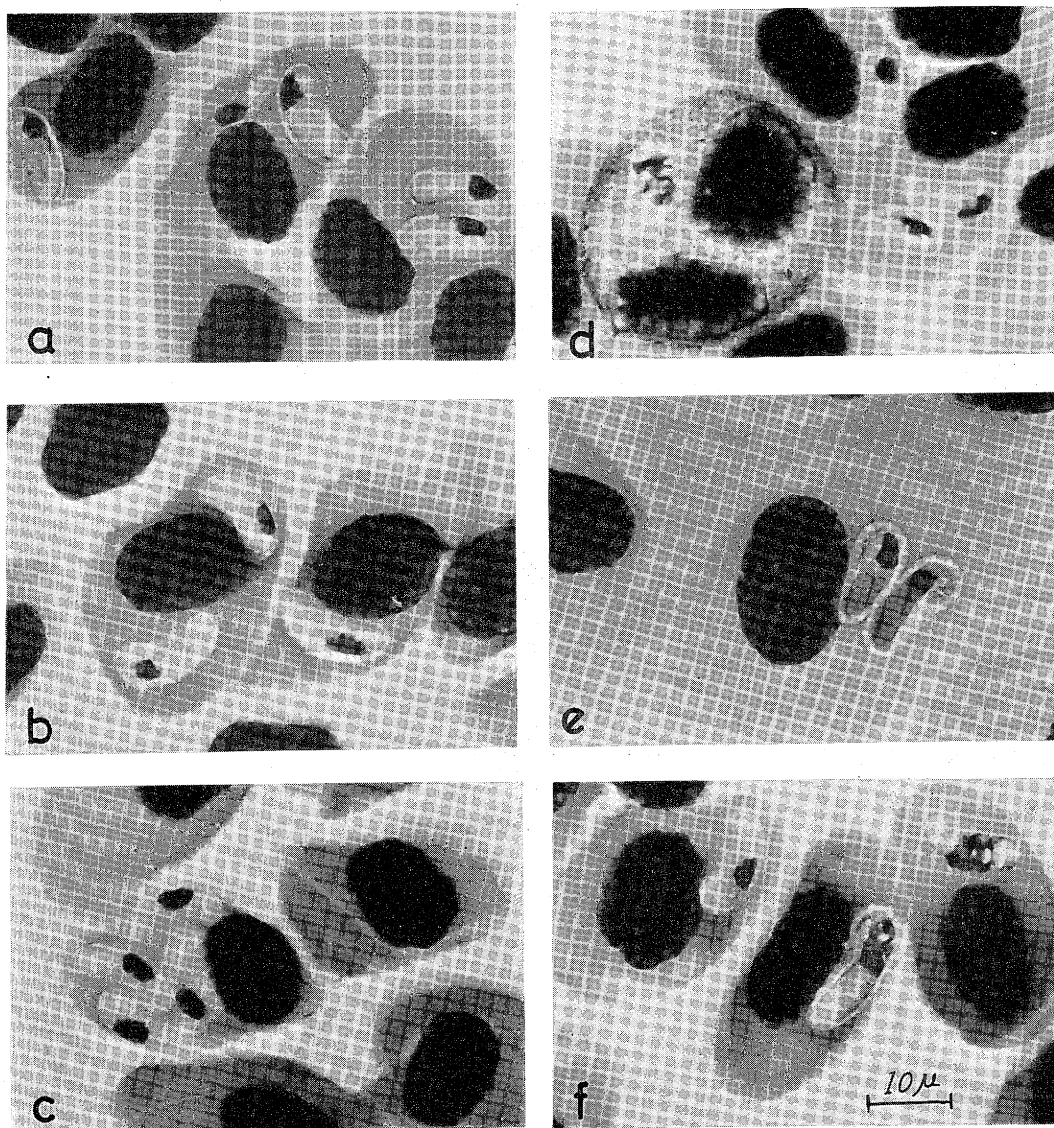


Fig. 2. Photographs of *Haemogregarina shirikenimori* n. sp. (1)

a-f. parasite in the erythrocyte of host animal; d(left). parasite in the leucocyte.

leech, *Haemadipsa zeylanica japonica*, is the most suspicious vector for this haemogregarine. Totally 12 leeches were collected on the body of 71 newts, but unfortunately the leech died before further examination.

#### DISCUSSION

From Anura, 27 species of haemogregarines have been reported in literatures (see Miyata, 1977a, in preparation), but only two species are known from Urodela:

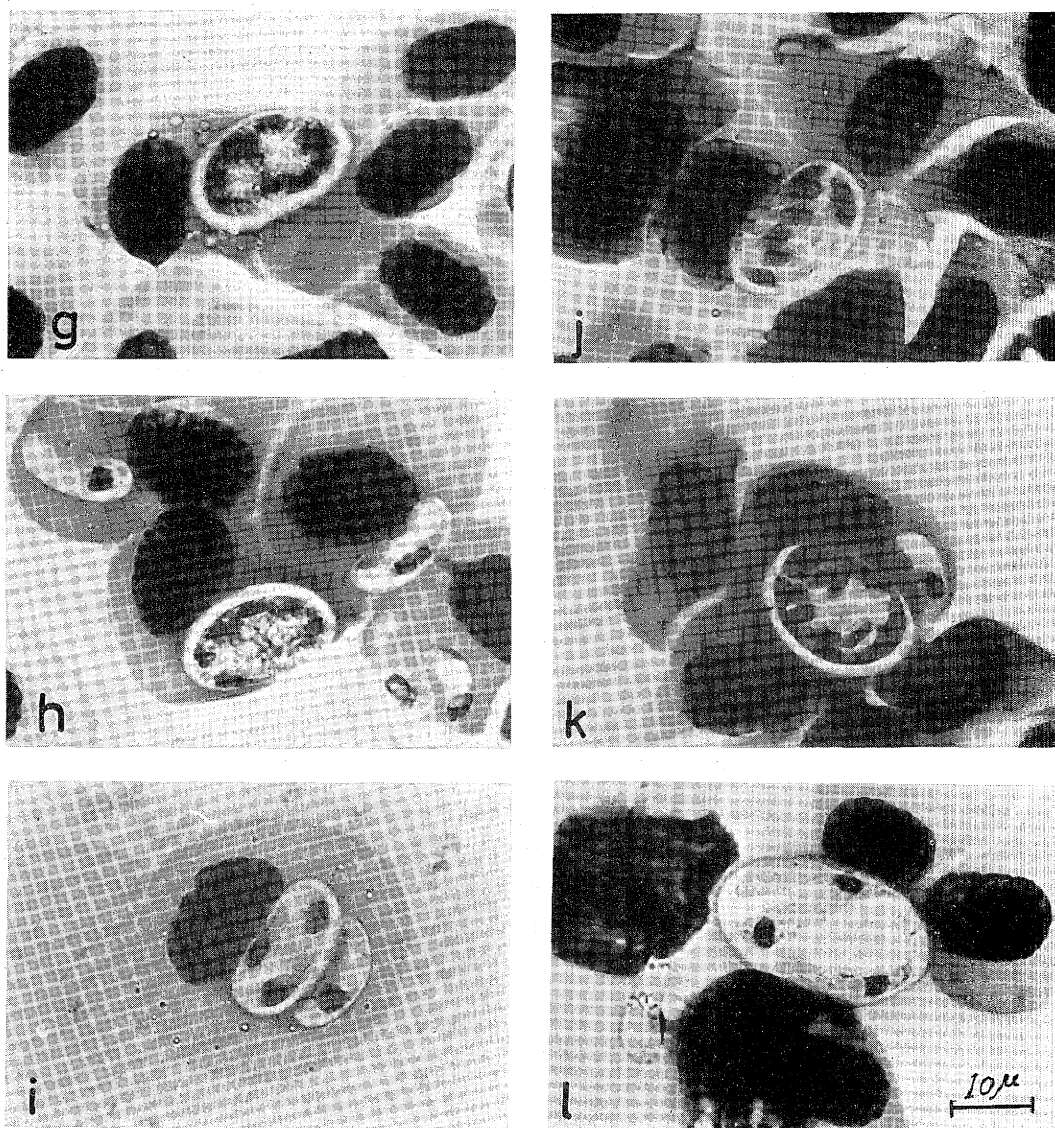


Fig. 3. Photographs of *Haemogregarina shirikenimori* n. sp. (2)  
g-k. schizonts (Type 1) in the erythrocyte of host animal; l. schizont (Type 2).

*Haemogregarina riedyi* Eysen, 1897      Host: *Batrachoseps attenuatus*

*Haemogregarina tritonis* (Fantham, 1905) Wenyon, 1926 (= *Lankesterella tritonis* Fantham, 1905)      Host: *Triton* (= *Molge*) *cristatus*

*Haemogregarina tritonis* should not belong to the genus *Haemogregarina*, and according to the original description, the parasite might belong to the genus *Dactylosoma*. Unexpectedly, the original description of *Haemogregarina riedyi*, was not listed in the "References to literature" in his famous book written by Wenyon (1926) whereas who introduced the specific name (see page 1396 in his book). *Haemogregarina riedyi* was discovered in California, U. S. A.

The third species of newt haemogregarine, *Haemogregarina shirikenimori* n. sp., was found from the blood of *Triturus pyrrhogaster ensicauda* in Okinawa Island. Gametocytes and schizonts of the haemogregarine are observed in the peripheral blood of the host newt. Such features and general morphological appearance show that the new species belongs to the genus *Haemogregarina*. The most possible vector of the haemogregarine is a kind of land leeches, *Haemadipsa zeylanica japonica*, which is also a possible vector for *Trypanosoma ogawai*. According to literatures, the members of the genus *Haemogregarina* are transmitted by leeches.

In the type locality of *Haemogregarina shirikenimori*, the author had examined anuran blood parasites, and at least two species of haemogregarine were detected from frogs, but such haemogregarines are apparently different from *Haemogregarina shirikenimori*. The haemogregarines detected from frogs in Okinawa Island will be reported in a separate paper by Miyata, Miyagi, and Tsukamoto (1977).

In this description, the author unfortunately could not refer the original description of *Haemogregarina riedyi*, but *Haemogregarina shirikenimori* might distinguishable from *Haemogregarina riedyi* based on the differences of geographical distribution and of genus belonging to their host.

#### ACKNOWLEDGEMENTS

The author deeply indebted to Dr. Masuhisa Tsukamoto, the Department of Epidemiology, Institute for Tropical Medicine, Nagasaki University, for his advices and encouragement, and also to Dr. Ichiro Miyagi, the Laboratory of Medical Zoology, College of Health Science, University of the Ryukyus, for his co-operation in collecting materials used in this study.

#### REFERENCES

- 1) Fantham, H. B. (1905): *Lankesterella tritonis* n. sp., a haemogregarine from the blood of the newt, *Triton cristatus* (Molge cristata). Zool. Anz., 29, 257-263.
- 2) Miyata, A. (1977): *Trypanosoma ogawai* n. sp. (Protozoa: Trypanosomatidae) detected from *Triturus pyrrhogaster ensicauda* (Hallowell, 1860) (Amphibia: Salamandridae) in Okinawa Island. Trop. Med., 19, 113-122.
- 3) Miyata, A. (1977a): Parasitic Protozoa. Its taxonomy, ecology and evolution. 1600 pp. (in preparation in Japanese).
- 4) Miyata, A., Miyagi, I. & Tsukamoto, M. (1977): Haemoprotezoa detected from the cold-blooded animals in Ryukyu Islands. Trop. Med., 19 (to be published).
- 5) Pearse, A. S. (1932): Parasites of Japanese salamanders. Ecology, 13, 135-152.
- 6) Wenyon, C. M. (1926): Protozoology. A manual for medical men, veterinarians and zoologists. Bailliere, Tindall and Cox, London.

沖縄産 シリケンイモリより 発見されたヘモグレガリンの1新種 *Haemogregarina shirikenimori*

宮田 彬 (長崎大学熱帯医学研究所疫学部門)

昨年6-7月、琉球大学保健学部の宮城一郎教授の協力で、沖縄本島北部国頭村与那の琉球大学演習林で、冷血動物の住血原虫類を調査した。その際、同地で捕獲した71匹のシリケンイモリのうち61匹(86%)の末梢血から発見されたヘモグレガリンは、新種であるので、*Haemogregarina shirikenimori* n. sp. と命名記載した。生殖母体の大きさは、 $13\sim 16 \times 3.5\sim 6$  ミクロンで、宿主の赤血球内の膜で囲まれたカプセル内に入っている。虫体は、カプセル内では、後半部を折り曲げているのでソーセージのような形をしている。稀れには、白血球内に入っている虫体もある。血球外に脱出した虫体は、折り曲げていた後半部を伸ばすので細長い。無性増殖生殖は、末梢血中でみられ、2型ある。第1型の分裂体は、大きさ $20 \times 10$  ミクロンで、長さ約10ミクロンの小さな娘虫体を3-16個形成する。第2型の分裂体は、長さ30ミクロン近くある大きなもので、検出されたのは、ただ1例であるが、長さ約20ミクロンのすでに成熟した大きな3個の娘虫体が入っていた。媒介者は、ヤマビル *Haemadipsa zeylanica japonica* である可能性が高い。現在知られている有尾類のヘモグレガリンは、*H. shirikenimori* をふくめ2種である。本種のカラー図版および世界の種々の動物から報告されているヘモグレガリン約300種については、著書「寄生原生動物—その分類・生態・進化」(B5判1600頁。文部省研究成果刊行費申請中)の中で、詳しく紹介した。

熱帯医学 第19巻 第2号105-111頁, 1977年6月