

CIRCULATION IN THE LYMPHATIC SYSTEM AND LATENCY OF *PLASMODIUM* MEROZOITES. PRELIMINARY NOTE

LANDAU I.*, CHABAUD A.G.*, VUONG P.N.*, DEHARO E.* & GAUTRET P.*

KEY WORDS : merozoites, lymphatic system, *Plasmodium* spp.

MOTS CLES : merozoïtes, système lymphatique, *Plasmodium* spp.

Many observations indicate that the invasion of erythrocytes does not occur necessarily immediately after the rupture of the blood schizonts and that the merozoites of some of the species of murine malaria parasites are latent and show a delayed penetration inside red blood cells.

These observations led Landau and Chabaud (1994) to conjecture that some merozoites had a lymphatic localization, thus escaping from contacts with the red blood cells (RBCs), and remain there for more or less long periods. The purpose of this preliminary note is to demonstrate the presence of merozoites inside the lymphatics.

To achieve this objective, mice heavily parasitized either by *Plasmodium yoelii nigeriensis* or by *P. vinckei petteri* were autopsied, and their viscera fixed with Carnoy's fluid and histological sections were stained according to the Giemsa colophonium method (Wolbach, 1911).

As expected, large numbers of merozoites were seen in the lymphatic system and particularly inside the lymphatics criss-crossing the mesentery; however, and unexpectedly, in addition to merozoites, many extracellular parasites of all stages were also present. The histological examination of the lymph nodes (the structure of which is easier to analyze than that of the spleen) gives some indications on the probable mechanisms involved.

Infected red blood cells enter the lymph nodes by the afferent artery and reach the cortico-medullar sinuses, as do small T and B lymphocytes (Gowans and Knight, 1984) via the post-capillary venules which represent the major pathway between venous and lymphatic systems. Inside these cortico-medullar

sinuses, parasitized red blood cells are in contact with numerous lymphocytes, monocytes and some polymorphs. At this site, many "naked" parasites released by destroyed RBCs can be identified. They reach the efferent lymphatic vessel and, via the thoracic duct, the blood circulation.

We would like to suggest that the naked parasites will be destroyed while the merozoites of some species such as *P. y. nigeriensis* keep their viability and penetrate a RBC as soon as they meet one.

Thus, the duration of the merozoite's latency would correspond to the time they linger inside the lymphatics. This time is usually very short but may be sometimes prolonged particularly under inflammatory or other pathological conditions. When merozoites dwell in the interstitial fluid, this phenomenon can be considered as sequestration of merozoites.

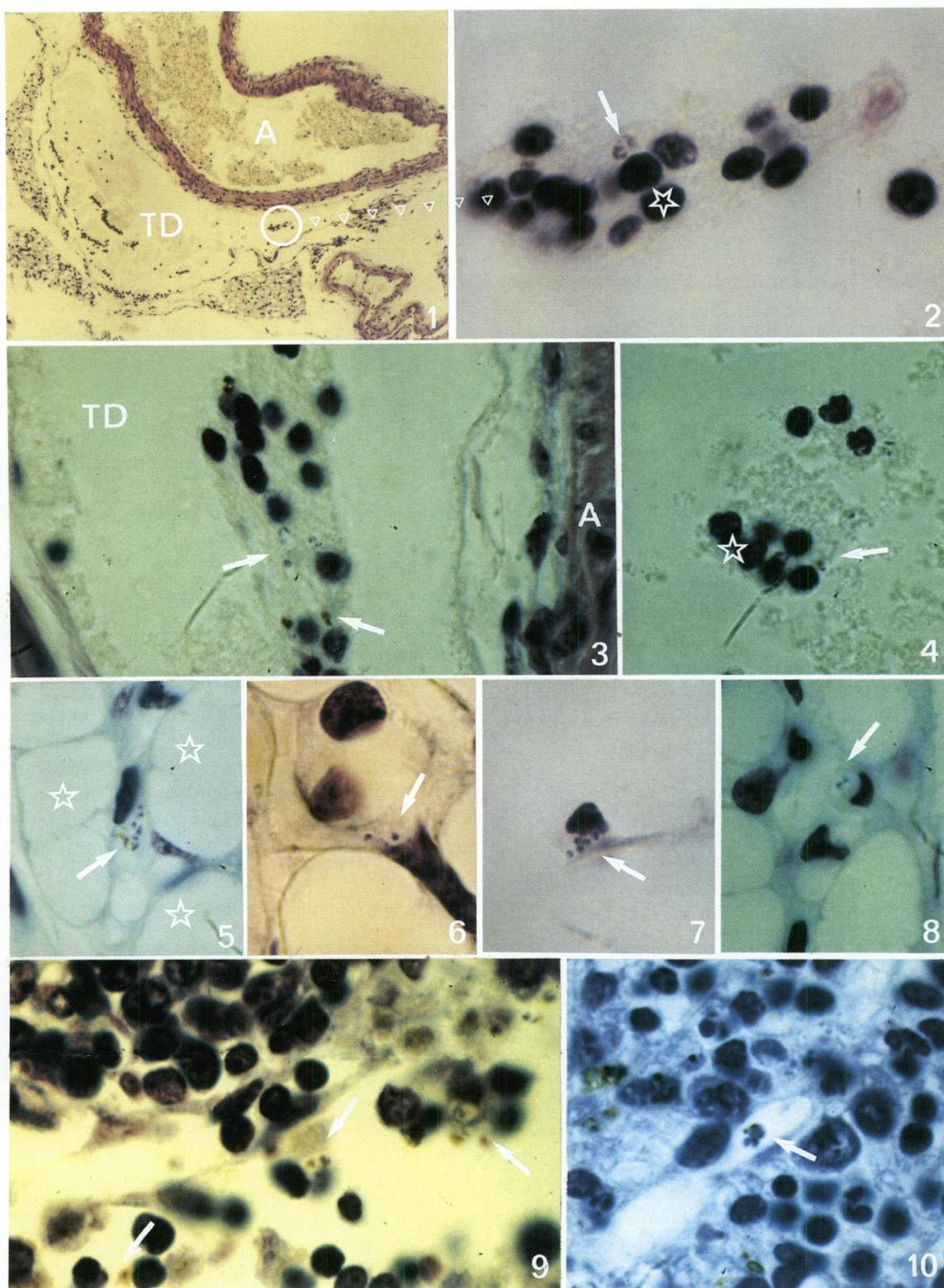
It appears that the lymphatic system plays an important but poorly known role in the life cycle of the malaria parasite, as it does in that of many other parasites.

REFERENCES

- LANDAU I. & CHABAUD A.G. Latency of *Plasmodium* merozoites and drug resistance. A review. *Parasite*, 1994, 1, 105-114.
- GOWANS J.L. & KNIGHT E.J. The route of circulation of lymphocytes in the rat. *Proceedings of the Royal Society*. London (Biology), 1984, 159-167.
- WOLBACH S.B. The use of colophonium in differentiating the eosinmethylenblue and other stains. *Journal of the American Medical Association*, 1911, 56, 345.

Accepté le 23 mars 1995

* Laboratoire de Biologie Parasitaire associé au CNRS, Muséum National d'Histoire Naturelle, Laboratoire de Protozoologie et Parasitologie comparée, Ecole Pratique des Hautes Etudes, 61 rue Buffon, 75231 Paris Cedex 05.



Figures 1 to 10 : Giemsa colophonium stained sections of mice infected with *P. v. petteri* (Figs. 1, 2, 3, 4, 9 and 10) and *P. y. nigriensis* (Figs. 5 to 8). Fig. 1 : A few "naked" parasites can be identified inside the thoracic duct which runs alongside the aorta. A= aorta; TD: thoracic duct. Fig. 2 : Enlargement of the area delineated in fig. 1. High power view of "naked" parasites (arrow) together with lymphocytes (*) in the thoracic duct (TD). Fig. 3 : Another group of "naked" parasites (arrows) intermingled with lymphocytes inside the thoracic duct. A: aorta; TD: thoracic duct. Fig 4 : "Naked"parasites (arrows) inside a lymphatic vessel can be identified among lymphocytes (*). Fig 5. : naked schizont (arrow) inside a lymphatic capillary running between 3 adipocytes (*). Figs. 6, 7, 8 : free merozoites inside lymphatic capillaries of adipous tissue. Fig. 9 : "naked" parasites (arrows) in the cortico-medullary sinuses of a lymph node. - Fig 10: "naked" schizont (arrow) inside a lymphatic vessel of the spleen.