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Immunity to Cross-Infection in Avian Malaria Due to Plasmodium Vaughani.

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For many years it was believed that infection with one species of avian malaria conferred protection against subsequent infection with that species only, and one of the tests by which a given species could be differentiated from another was to inoculate a subpatent or chronic infection of the former with the suspected new species. Recently it has been shown by Gingrich[1] and others that this is not always the case, but this method is still an important test of specificity.

The species used in the present work was originally described by Novy and MacNeal[2] from the common robin in 1904, and the strain employed was isolated from a catbird caught in Syracuse in April, 1934. The other species with which *P. vaughani* was crossed were secured from sources previously mentioned by the author.[3, 4] Female canaries were used throughout.

Before inoculating a bird with a latent infection the continued presence of an infection was checked either by microscopic examination or (since this is usually negative) by subinoculation into fresh birds. Inoculations were generally intravenous, and large doses of parasites were usually used. Ten series of 3 birds each (in addition to one or more controls in each series) were used, 5 being chronic cases of *P. vaughani* and the others consisting of one series each of *P. cathemerium, praecox (relictum), circumflexum, elongatum,* and *rouxi.* Each series of chronic *vaughani* infections was inoculated with one of the other species named, and the experiment was then reversed, using chronic infections of the latter.

The results show that a subpatent (chronic) infection with *P. vaughani* confers little if any protection against subsequent infection with the 5 other species named, and the reverse of this relationship appears to hold true also, except that there is some indication that a pre-existing infection with *P. praecox (relictum)* gives a partial immunity to subsequent infection with *P. vaughani.* That

[1] Gingrich, Wendell, *J. Prev. Med.*, 1932, **6**, 197.

[2] Novy, F. G., and MacNeal, W. J., *Am. Med.*, 1904, **8**, 932.

[3] Manwell, R. D., *Am. J. Hyg.*, in press.

[4] Manwell, R. D., *Am. J. Trop. Med.*, in press.

neither *P. rouxi* nor *P. vaughani* confers any protection against the other is rather difficult to demonstrate with certainty because of the very close morphological resemblance between these 2 species, but all the evidence seems to point that way. Birds having a chronic infection of *vaughani,* for example, usually show no parasites after a few weeks, whereas those infected with *rouxi* generally show parasites for months or years. Chronic cases of one of these 2 species, when infected with the other, behave as do pure chronic infections of *rouxi.* In view of the close resemblance of these 2 species, the absence of cross-immunity is surprising. It confirms the evidence offered by the differences in natural hosts, in geographical distribution, in morphology, and in type of infection, that these 2 very similar species are in reality distinct.

An incidental result of this study has been the finding of 2 cases of complete recovery from *vaughani* infection, as shown by failure to infect fresh birds with massive doses of the blood of these cases. This is a very rare occurrence in avian malaria of any kind. Superinfection was not tried in these cases for unavoidable reasons, but it is easily possible in birds cured by drugs, and is impossible in cases of chronic infection.

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Observations on a Dog Maintained for Five Weeks Without Adrenals or Pancreas.

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We have previously reported[1] some preliminary observations on totally adrenalectomized-depancreatized cats. Several workers in the past have attempted this double operation upon dogs and in no instance have the animals survived more than a few hours. Such results as have been obtained have led to the conclusion that total adrenalectomy had no influence upon the subsequent course of the diabetes. During the past year we have completed the double operation upon a dog which was observed over a period of 5 weeks.

The dog (a male weighing 11.2 kilos) was totally depancreatized on March 9th, 1934, the left adrenal removed on March 20th, 1934,

[1] Long, C. N. H., and Lukens, F. D. W., *Science,* 1934, **79**, 569.