Fig. 2. TRANSVERSE SECTION OF THE SPERMATIC CORD. $\times 9$

different mammals, it seems that the different arrangements possibly have a common functional significance, namely, to provide a mechanism for the exchange of heat in the temperature control of the testis. Experiments to test this inference are now being undertaken.

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Relationships in the Plumbaginaceæ

POLLEN- and associated stigma-dimorphism within the family Plumbaginaceæ were discovered in 1883 by McCleod¹, who observed them in *Limonium*. Since then, the range of genera showing pollen-dimorphism has been extended by various authors²⁻⁵ to include *Armeria*, *Acantholimon* and *Limoniastrum*, while stigma-dimorphism has also been demonstrated in *Armeria*^{3,4}.

I have made a survey of all genera within the family and have established that the clear pollen-dimorphism is found only within the tribe Staticeæ, where there is no reason for believing that it has arisen more than once. The tribe Plumbaginaceæ contains only pollen-monomorphic genera, and there is evidence that this monomorphism is primitive. Extreme modification in embryo-sac structure is typical of the Plumbaginaceæ⁶ but not of the Staticeæ, so that the direct derivation of the latter from the former is not possible. It is probable that the two tribes represent diverging lines from a common (but very ancient) ancestral stock. Within the Staticeæ, *Ægialitis* is unique in showing pollen-monomorphism with grains which are probably of the same type as in the Plumbaginaceæ. This genus is likely to be more ancient than any others within its tribe and therefore to have diverged least from the Plumbaginaceæ.

In the remaining genera of the Staticeæ, pollen-dimorphism appears to be intimately connected with a genetically determined incompatibility mechanism. Derived monomorphism, however, occurs in *Limonium* and *Armeria* at least and appears to be connected,

here, with self-compatibility, which may be of use in regions where pollinating insects are sparsely represented and also in facilitating establishment after long-distance dispersal.

Heterostyly occurs in *Limonium*⁷, and in the Plumbaginaceæ^{7,8}, but there is some slight evidence that the development of the incompatibility mechanism made visible by pollen- and stigma-dimorphism has preceded heterostyly in the Staticeæ. If this be true, heterostyly in the two tribes would have resulted from parallel evolution.

The detailed results of these and other studies within the family will be published elsewhere in a series of papers, but this further extension of the use of pollen-morphology to indicate relationships is possibly of general interest.

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Pharmacology of Ch'ang Shan (*Dichroa febrifuga*), a Chinese Antimalarial Herb

FOR centuries in China the roots (Ch'ang Shan) and the leaves (Shuu Chi) of *Dichroa febrifuga*, Lour. have been used against malarial fevers. In our first report¹ in 1943, it was recorded that a crude extract of this root had been effectively used on clinical cases of tertian malaria. Then in 1945, when *Plasmodium gallinaceum* became available to us, we found that the crude extracts of both the root and the leaves of the herb were also effective for chicks infected with *P. gallinaceum*, the leaves being about five times as active as the roots. An alkaloidal fraction of the root exhibited a marked anti-malarial activity, but of the three alkaloids, *F* (later called dichroine *A*), *G* and *I*, and two neutral principles, *E* (later dichrin *A*) and *H* (later dichrin *B*), none was found active². In the following year we announced the isolation of an active alkaloid, dichroine *B*, melting at 237-238° C. with decomposition (considered as hydrochloride at first, later identified as dihydrochloride). It was effective against chicken malaria in intramuscular doses of 2-4 mgm./kgm. twice or thrice a day³. The empirical formula of dichroine *B* was first reported as $C_{16}H_{19}O_3N_3$ ⁴, and later as $C_{16}H_{21}O_3N_3$ when purer batches were examined⁵. As reported to the general conference of the Chinese Physiological Society on May 14, 1947, we had thus far isolated from Ch'ang Shan altogether five alkaloids and two neutral principles. Among the five alkaloids, dichroine *A*, dichroine *B*, dichroine *C*, dichroidine and quinazoline (4-keto-dihydroquinazoline), the first three members were soon found to be isomers mutually convertible under certain conditions. In conformity with the conventional nomenclature of isomers, they have been, thenceforth, called dichroine- α , dichroine- β , and dichroine- γ respectively⁵. With the probable exception of dichroine- α , all these alkaloids are more or less effective against *P. gallinaceum* infection in chicks, their antimalarial activity being in the