conditions it is possible to dry them without destroying their vitality.

Five strains of spirochætes have been used in these preliminary experiments; two culture strains of *Spirochæta pallida* obtained respectively from Kroo and Vasarhelyi, and three strains of *Spirochæta biflexa*, the common water leptospira, two Leyden strains obtained from Schüffner and van Theil, and a strain which I have recently isolated from London sewage. Extremes types of spirochætes were thus included, for *Spirochæta pallida* is somewhat exacting in its cultural requirements and in addition to being very susceptible to variations in the media, normally requires subculturing every week, whilst *Spirochæta biflexa* is much more resistant and, at room temperature, cultures will remain positive for some months.

About 0·5 c.c. of a rich suspension of the spirochætes in their respective media, which both contained approximately 10 per cent of rabbit serum, was placed in each of a number of small sterile test-tubes. The tubes were then placed in a freezing mixture at −10° C. until the contents had solidified, and then placed in a desiccator containing phosphorus pentoxide, and the air exhausted as quickly as possible. The desiccator and its contents were then left in the ice chest and the desiccating agent renewed the following day and the air again exhausted. After 15 days under these conditions, the dried contents of the tubes were inoculated into fresh culture media, and in every case the spirochætes were found to have remained alive. The strains of *Spirochæta biflexa* seemed to grow more slowly than when ordinary motile spirochætes were used for inoculating the culture tubes, but in the case of the two strains of *Spirochæta pallida*, their rate of growth seemed to have been unaffected.

Although at present the vitality of these spirochætes dried *in vacuo* has only been tested up to 15 days, there is no reason to doubt that they will remain alive for very much longer periods. This method, therefore, should be of value for the maintenance of strains of spirochætes in the laboratory, as it reduces the necessity for repeated subculturing.

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Insect Transmission of Spike Disease

IT has been recently announced[1] that transmission experiments with the Jassid, *Moonia albimaculata*, have yielded three positive results; that the symptoms so produced are inseparable from typically spiked plants on morphological, biochemical and cytological grounds.

This important result was the subject of a discussion at one of the meetings of the Working Committee on Spike-Disease Investigation (July 28, 1933) when Dr. V. Subrahmanyan, in view of the fundamental nature of the finding, suggested that the result should be critically examined in all its aspects. As a result of the discussion, it was felt that the evidence, based on symptomatic and other grounds, was by itself not sufficiently conclusive to justify the incrimination of *Moonia* as the vector of spike disease. It was therefore suggested that the matter should be regarded as *sub judice* pending the results of infectivity experiments by grafting, which was considered to be the decisive test in doubtful cases of disease.

It is well known that the sandal plant assumes a variety of morphological characteristics, some of which are often mistaken for the condition of spike. Experiments have shown that this condition can be brought on by deprival of host plants, an impoverished soil, drought and other adverse soil and climatic factors. These symptoms can be distinguished from those of a genuinely spiked plant, are not transmitted to other healthy plants by grafting and can be made to disappear when the adverse conditions are removed.

A typical spiked plant, however, is infective, the symptoms of the disease being communicable to other healthy plants through grafting, a technique which has proved most useful in determining the infectivity of doubtful cases of spike. It is the infectious character of the disease that renders the problem economically important and serious.

It is clear from the above discussion that it is important to distinguish between the curable and non-infectious condition of stunting induced by an adverse environment, as against the deadly and infectious condition of spike disease, which, to an experienced worker, is not difficult to diagnose. The following are results of grafting tests which have been carried out:

Leaves from	Number of plants operated	Number of plants spiked
Spiked plants .	12	9
Insectary plants .	14	0

They confirm the suspicion that the three plants alleged to be diseased only represented a stunted condition which was brought on by an impoverished soil, want of a vigorous host and probably aggravated by insect feeding. The symptoms have not been transmitted through grafting, and further, the plants themselves, after a careful nursing with fresh soil and host, have since turned completely healthy.

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Jan. 18.

[1] NATURE, **132**, 592, Oct. 14, 1933.

Bilateral Gynandromorphism in Feathers

MR. PAUL 'ESPINASSE has recently pointed out[1] some difficulties preventing complete acceptance of the growth rate theory of Lillie and Juhn[2] in which bilateral gynandromorphism of individual feathers is supposedly explained. The existence of differences in rates of growth of individual barbs, by which these authors explain different degrees of susceptibility to female hormone, would be proved if, in successive cross sections of a feather, barbs arising near the ventral point fused with the rhachis at a higher level on one side than on the other, but this has never yet been observed.

The concrescence theory of development of a feather, in which the rhachis is regarded as formed from two halves of a collar (the growing basal region) is also due to these authors, but this interpretation, necessary for an explanation of the growth rate theory of Lillie and Juhn, is not in agreement with the results of Davies[3] and Strong[4].