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THE DEMONSTRATION OF THE SPIROCHETA PALLIDA BY THE METHOD OF DARK FIELD ILLUMINATION.

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DURING the past two years so many observers have been able to find the spirocheta pallida in syphilitic lesions of all sorts that this organism, although not yet grown in pure culture, is regarded by nearly all authorities as the true causative agent of this disease. Indeed, failure to demonstrate this spirocheta in an undoubtedly syphilitic lesion is to-day regarded, not as proof that it is absent, but as the fault of the method employed.

The differentiation of the pallida from most other spirochetæ is easy, there being only one or two with which it may be confused, such as the sp. refringens and the sp. dentium. The pallida is a very delicate organism, with slight refractile power, of corkscrew-like form. Its twists are steep, short and regular, becoming less high toward the ends, thus giving a pointed form. Its motion is of three sorts: rotation on the longitudinal axis, backward and forward swaying, and bending. The spiral twists are retained during motion. It is with difficulty stained. Most other spirochetæ are coarser, with broader, flatter and more irregular twists, and are easily stained.

In tabular form these differences are as follows:

	Pallida.	Refringens.	Dentium.
Occurrence.	Syphilitic lesions.	Genitalia.	Mouth.
Refractive power.	Slight.	Most.	Least.
Length.	4-20 μ .	10-30 μ .	4-12 μ .
Thickness.	$\frac{1}{4}$ μ .	$\frac{1}{2}$ - $\frac{3}{4}$ μ .	$\frac{1}{4}$ μ .
Motion.	Slowest, bends.	Most rapid, does not bend.	Slow, principally rotation.
Twists.	Regular, steep, short. Persist during motion.	Irregular, broad, flat. Often lost during motion.	Regular, short, flat. Often during motion.
Takes stain.	Slightly.	Easily.	Easily, but pale.

A very valuable addition to the various methods at our command for the demonstration of the spirocheta pallida is the microscopical observation of it in a motile state by means of the so-called "dark field illumination." Although this arrangement of the microscope has been used by bacteriologists for a number of years, it has recently been made much easier by the *paraboloid condensor* of Siedentopf. This condensor, taking the place of the usual Abbé condensor in the substage of the microscope, overcomes several of the optical errors accompanying the older methods. Briefly stated, the results obtained by this condensor are nearly the converse of those present when the microscope is used in the usual manner. With the ordinary method one sees the field uniformly illuminated, and all interposed objects appear as more or less dark bodies on this field. By the method under consideration, however, the field is black, or nearly so, while interposed objects appear luminous and refractile. This is due to the fact that the only light which enters the objective is that thrown into it by bodies denser than their surrounding medium. By this means motile organisms show with great clearness.

FIG. 1. A. Paraboloid condensor. B. Central diaphragm excluding all but peripheral rays. C. Slide with cover slip. D. Dry lens of high power. E. Cedar oil between condenser and slide. Note that the light rays fall outside the objective when not refracted into it by some object beneath the cover slip.

Since the light rays must have their point of total refraction at the surface of the cover slip, the space between condenser and slide is filled with cedar oil, i. e., the condensor is "immersed." A dry lens of high power is used in the objective. Ordinary daylight being too diffuse and of insufficient intensity, illumination is best derived from either an arc lamp or an incandescent light of fifty or more candle-power. The light from this source is brought to a focus just in front of the substage mirror by a system of condensing lenses of short focal length. By this means the distance from light to microscope is brought within the limits of the ordinary table or desk.

Technic of preparation of slide.—In preparing the slide for examination, the two main endeavors are, firstly, to be as sure as possible that spirochetæ have been abstracted from the lesion under inspection, if they be present, and secondly, to carry to the slide but few pus cells, blood corpuscles and extraneous matter. The various methods of obtaining material, as given by Beer, are as follows: (1) Wash the lesion with salt solution and rub its surface with the platinum loop till serum exudes. (2) Scrape with a small sharp curette. (3) Incise and examine the serum which flows. (4) Examination of macerated material obtained by excision. (5) Examination of material obtained by puncture of satellite gland by the hollow needle. Numbers 1, 3 and 5 are most suited to the dark field investigation.

FIG. 2. Illumination. A. Incandescent light of 50 to 80 candle-power. B. Condensing lens in stand. C. Mirror of microscope.

Of these the writer has had experience only with those methods described under numbers 1 and 3. Neither of these has been as satisfactory as when the material has been obtained by *suction* either with or without previous incision, according to the nature of the lesion. This has been accomplished by means of a metal syringe with solid, well-fitting piston, connected by a short piece of thick-walled rubber tubing to a glass rod, the end of which has been expanded somewhat in the shape of a "blunderbuss." Such glass rods should have a comparatively thick wall, and small lumen of about 2 or 3 mm. Their length should be from 6 to 12 cm., the longer ones being used to reach areas in the oropharynx. The most convenient size of syringe is one of about 20 to 30 cm. capacity. By applying the end of the glass rod firmly to the lesion and withdrawing the piston one gets a similar action to that of the dry cup. Sufficient serum having thus been obtained, the rod is removed from the rubber tubing and a few drops of water or salt solution are allowed to run through it by means of a medicine dropper. These are collected on the slide, and the water and serum well mixed by stirring with the end of the rod. A cover slip is laid on, and the slide is ready for examination. Care should be taken not to use an excess of water, as this leads to soiling of the fingers and microscope stage.

Since the spirochetæ vary extensively in number, according to the nature and age of the lesion, at least four slides should be prepared and searched before they are declared absent. They are most numerous in secondary lesions, while in primary lesions the earlier the examination, the easier is the organism demonstrated. Antiluetic treatment does not appear to change its morphology. The presence of some blood in the slide is of aid, as the corpuscle, in freshly made

specimens, affords a measure of known size with which to compare the spirocheta.

Although familiarity with the appearance of the pallida in the dark field makes its recognition quite certain, it will be found advisable in some instances to examine the organism in the stained specimen. This is best done by means of Wright's stain applied from thirty to forty-five minutes, followed by only slight washing with water. The Giemsa stain is also of value. It is easier to overlook the organism in the stained specimen, however, than when it is sought in its motile state.

CONCLUSIONS.

1. It should be a routine practice to examine all suspicious lesions for the spirocheta pallida.
2. The organism has a definite morphology and can be differentiated from other spirochetæ by careful microscopical examination.
3. This is best done by the method of dark field illumination, with or without subsequent examination of a stained specimen.
4. Since the organisms are not always numerous on the surface of the lesion, the method of obtaining them is of importance. A most satisfactory way is that of suction as described above, and the case should not be pronounced negative until some such method has been used.

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The condensor is manufactured by both Zeiss and Reichert and may be obtained through their American agents.

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Reports of Societies.

AMERICAN GASTRO-ENTEROLOGICAL ASSOCIATION.

The eleventh annual meeting was held at the Auditorium Hotel, Chicago, Ill., June 1 and 2, 1908, the President, Dr. JOHN P. SAWYER, of Cleveland, in the chair.

THE PRESIDENT'S ADDRESS.

Dr. SAWYER, in his opening address, briefly reviewed the work of the Association during the past year and called attention to the fact that its membership was composed of surgeons, pathologists, physiologists and internists, and that such a composite membership could not but result in broad discussion and in an eliminative