

We feel that our brother practitioners, to whom a work in the German language happens to be a sealed book, have reason to rejoice that most (though unfortunately not all) of this invaluable contribution to medical science has already a place in our standard American literature, and we heartily congratulate its gifted and accomplished author on that comparatively rare mastery of two distinct tongues which enables him to inculcate his teachings upon such a most important subject with equal facility to both the leading nations of the civilized world. J. G. R.

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ART. XXVIII.—*Inoculation of Leprosy upon Animals.* (*Separatdruck aus Virchow's Archiv*, 1882, Band 88.)

PROFESSOR HEINRICH KÖBNER, of Berlin, gives in this reprint an account of his attempts to inoculate various animals with leprosy. The material employed was from a German who had acquired the disease after a residence of eleven years in Pernambuco. It first exhibited itself in its macular, anæsthetic form, to which subsequently tubercles were added. On the twelfth of April, 1881, one of these nodules was cut out from the patient's thigh, and examined with the assistance of Dr. Koch, who also aided the author in the subsequent experiments. Considering the notions which prevail in leprosy countries, that the disease is in some way connected with a fish diet, it was determined to make the trial upon fishes as well as upon representatives of the other vertebrate classes. The tissues and juices of the nodule, having been properly examined and found to contain the expected bacilli, were transplanted upon and inoculated into the following animals: 1. A medium-sized ape from Java, in the subcutaneous cellular tissue of the back, in the skin of both ears, of both upper eyelids, and the mucous membrane of the under lip; 2. Two Guinea pigs, subcutaneously at the bottom of the ears; 3. Three white rats and mice, subcutaneous transplantation in the groin and back; 4. Two rabbits, transplantation of a portion of the nodule into the anterior chamber of the eyes; 5. A pigeon, subcutaneously in the neck; 6. Three eels (*Anguilla vulgaris*), transplantation into the skin of the neck; 7. A mudfish (*Cobitis*), into the muscles of the back; and 8. A frog, into the dorsal lymph-sac.

The frog died April 25th, and on May 23d one of the eels, without exhibiting any bacilli in the blood or tissue. One of the rabbits died on June 7th of pneumonia, the other was killed Sept. 30th. In neither was any leprosy matter or free bacilli. The rats, mice, and the dove were killed after months with the same result. The Guinea pigs, after two successive pregnancies, as well as their young, were found to be free from any signs of leprosy or bacilli, and an examination of the tissues at the points of inoculation showed doubtful vestiges of the foreign material encapsuled, but no bacilli. The fishes exhibited after two or three months an affection of the skin of a parasitic nature, in which bacilli were found, but not those characteristics of leprosy, and with which they are frequently affected, both in their ocean life, and the aquarium. The ape exhibited on July 15th a brown, nodular swelling on the upper lip, which increased so much in resemblance to a leprosy nodule that at the

time of its death, August 18th, under symptoms of hectic fever and dyspnoea, it was regarded by those familiar with the appearances of leprosy as evidence of a successful inoculation. Examination showed, however, that the animal died of general tuberculous disease, and that neither the blood, the tissues, the seats of the inoculation, nor the nodular swelling upon the lip contained bacilli. Moreover, inoculation with the tubercular matter produced miliary tuberculosis in two Guinea pigs after six weeks. Thus in none of the animals was general or local leprosy produced by this series of inoculations.

An examination of the eyes of the rabbits, one on the fifty-sixth day, one in five and a half-months after inoculation, gave the interesting results that the minute portions of leprosy tissue implanted at that time were found in a slightly shrunken condition near the scleral edge of the cornea. They contained as at first the bacilli in a complete state of preservation, but with no new development, and with no migration into the tissues of the iris or cornea. So unchanged were they that the author would regard the aqueous humour as the best preserving medium for the contents of lepra cells. This result in Köbner's opinion throws doubt upon Neisser's conclusion, that finding bacilli a short time after inoculation at the point of insertion is proof of new development of bacteria or of the reproduction of local leprosy upon animals. The durability of these growths is further shown by the author in the recent examination of two old specimens. The first, received by him nine years previously and preserved in weak alcohol, consisted of large leprosy nodules from the trachea and skin. Two years ago he examined them by methods of treatment then employed, but failed to find any evidence of bacilli. Recently, after hardening for several weeks in 96 per cent. alcohol, then treating the sections with somewhat concentrated acetic acid, afterwards with a 5-10 per cent. potash solution, then with a one per cent. aqueous "gentiana-violet" solution, and finally washing in alcohol, by oil of clove and balsam, an abundance of bacilli became evident both in the portion of tissue previously coloured and in those previously untouched. The staff-like bodies were found at the edges of the vacuoles, which he with Neisser regards as degenerated masses of bacilli, in the small infiltrated cells, and free in the connective tissue. The second specimen was a dried leprosy nodule, removed by him nineteen years previously in Norway, and kept wrapped in paper since then. After the above treatment the bacilli were found so sharply defined that the author is inclined to consider the drying process as the most useful method of preserving material for examination. Köbner calls attention in his detailed account of the appearances of these growths, which agree with those of Neisser, and Cornil and Souehard, to the important fact that the leprosy cells and bacilli never penetrate the epidermal layer from below upwards, so that the rete always forms a sharply-defined boundary line in the cutaneous nodule; in other words, a protection against inoculation while unbroken. As an open source of contagion, on the other hand, he regards the pus and granulations of leprosy ulcers. The wound made during the excision of the nodule from his patient for the above experiments became excoriated in the bath after six months, and the granulation tissue, and pus removed from this exhibited, when properly treated, abundant bacilli.

Examination of the blood, taken from young and old nodules upon the patient, when fresh, gave no result, but when the cover glass with the dried blood was heated, then coloured and washed in alcohol after Ehrlich's

method, slender bacilli were found in the protoplasm of the white corpuscles, and also in the serum. This constant occurrence of the same bacillus in all the tissues affected by leprosy warrants, in the author's opinion, the conclusion that it is specific, and most probably its cause. That the disease affects healthy settlers in leprosy regions, and its endemic limitation to certain districts, as in Norway and Italy, are indications that a specific cause is to be sought for. Proofs of its parasitic character are, however, yet to be obtained, although negative results of inoculation upon animals as the above are in no way conclusive. Perhaps had the ape lived longer the result would have been very different. In view of the newly-collected evidence concerning its contagiousness, he considers the isolation of the leper by confinement the best means of overcoming leprosy as an endemic disease.

J. C. W.

ART. XXIX.—*Lectures on the Pathology and Treatment of Lateral and other Forms of Curvature of the Spine.* By WILLIAM ADAMS, F.R.C.S., Surgeon to the Great Northern General Hospital, etc. etc. Second edition, pp. 302. London: J. & A. Churchill, 1882.

MR. ADAMS has long taken rank among the best teachers of orthopædic surgery. His works bear the impress of patient research, with a large and varied experience. These lectures were originally delivered in 1860–61, now twenty years since, and were first published in 1864. The work was justly regarded at the time of its issue as the most complete treatise on that subject extant. The present edition is a careful revision of the previous edition, with an addition of the views of recent authors in a few notes and a short appendix. It is only the notes and appended matters, therefore, that we need to notice.

The muscular theory of the causation of rotation of the spine advanced by Dods, and maintained by Barwell, is discarded, and the mechanical theory of Shaw advocated. Judson added to Shaw's explanation, the action of the muscular and fibrous attachments of the spinous processes, which tend to maintain these portions of the vertebræ in the median line, while the bodies, being unsupported, deviate to the right or left under the vertical pressure, which is the direct cause of lateral curvature. It follows that while the posterior portions were held in the median plane by the muscular and fibrous attachments, the bodies of the vertebræ fall away from the median line to the right or left. This additional explanation is approved by the author.

In discussing methods of treatment the author enters upon debatable ground of great interest to American surgeons. The question of the value of the recently adopted plaster jacket of Dr. Sayre is considered, and judgment is given adverse to its employment in any form of lateral curvature. The author remarks on cases where there is slight structural changes: "The plaster-of-Paris jacket, embodying, as it does, the principle of immobility, is inapplicable to these cases." He favours combining mechanical support, gymnastic exercises, and partial recumbency. The mechanical support recommended is in the form of the steel spinal instrument with spring plates.

In confirmed structural curves the author also rejects the plaster jacket,