

"Tropical Nature," we read as follows:—"A systematic planting of all hill-tops, elevated ridges, and higher slopes, would probably cure the bad effects of the intermittent rainfall of Central India; whilst the action of forests in checking evaporation from the soil, and in causing perennial springs to flow which may be collected in reservoirs, would serve to fertilize a great extent of country."

Major Powell evidently disagrees with the results of Wallace's observations, but the facts are quite opposed to his theories. Forests do not evaporate moisture nearly so fast as bare ground; and although denuded hill-sides may favour the accumulation of snow-drifts, yet they allow the rainfall to drain off rapidly, and cause dangerous floods; loosening of the soil on hill-sides; avalanches; silting up of river-beds; and frequently give rise to the complete devastation of cultivable lands at the foot of the hills, as the material washed down from above is spread over them by the floods in the form of silt, gravel, and boulders.

In Dr. Schlich's "Manual of Forestry," at pp. 43 *et seq.*, we read that experience in Germany shows evaporation from forests to be only two-fifths of that in the open country, and that the balance of water retained in forest soil increases rapidly with the altitude, so that evaporation in mountain forests may be reduced to about 10 per cent. of the rainfall. We also know that, in France and Germany, mountain forests have long been looked upon as preservers of moisture and feeders of springs. In 1889, the French Government spent 3,192,800 francs in *reboisement* works in the Alps, Pyrenees, and Auvergne; and this almost entirely for the indirect benefits resulting from forests to the mountains, as the plantations and embankments which form the *reboisement* works are too costly ever to yield a direct revenue commensurate with the heavy expenditure incurred in such remote and inaccessible places. If, however, Major Powell's proposed denudation of the Rocky Mountains were to be effected, besides its disastrous indirect results, America would suffer from a greatly curtailed supply of timber to meet the ever-increasing demands of a vast continent, which cannot depend on any adequate supply from abroad. We see that in the McKinley Act the Government of the United States already acknowledges its own short supply by withdrawing all import duties from Canadian timber; and it is for Canada to assure its own future prosperity by establishing a State forest service to prevent the exhaustion of the Canadian forests, now that they are likely to be fully utilized.

Up to the present time, the Forest Department of the United States has been chiefly occupied in collecting forest statistics and encouraging private planting, but what is really required is to induce each State in the Union to establish a practical control of its own still existing forests.

The Americans have recently refused to join in a postal federation of English-speaking countries, on the ground that they are now to a large extent German-speaking as well; it is a pity, therefore, that they do not listen to the warnings of the German forester, Dr. Mayer, who has studied the forests of the Rocky Mountains and has given the last word of German scientific opinion on the utter absence of a State forest policy in the United States, in his recently published work on the forest trees of North America.

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Throwing-Sticks and Canoes in New Guinea.

I HAVE just received here my copy of the February number of vol. xix. of the Journal of the Anthropological Institute, in which I have read, with the greatest interest and appreciation, the long and valuable account of the western tribe of Torres Strait, by Prof. Haddon. With regard to the throwing-sticks, of which, on p. 332, he says, "the heavy spears of South-east New Guinea are hurled by a throwing-stick which differs from any Australian implement," I think some error must have been made by his informant. I never saw a throwing-stick in existence, or in use, during my three years' residence in the country, either in the interior, along the south-eastern peninsula, in the Louisiade Archipelago, or on the northern coast as far as Mitre Rock. If these implements do exist on the southern side, they must be very rare. The first spear-thrower from New Guinea brought to England, as far as I am aware, was, nevertheless, the one brought home by me in 1888, which is now in the British Museum. It came, however, from the German possessions on the north-east coast, either from Finch-haven, or from the Augusta River, if I recollect correctly, and was given to me in Cooktown.

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In the same paper, on p. 384, occurs this passage with regard to canoes:—"I was much puzzled when I first went to Torres Straits by occasionally seeing a canoe with a single outrigger. I afterwards found that it belonged to a Kanaker from Ware (? Mare), one of the New Hebrides, residing at Mabuag, and that he had outriggered a native canoe according to the fashion of his own people. When I was at Mabuag, some natives of that island were fitting up a canoe in imitation of this one, and with a single outrigger. Here a foreign custom is being imitated." The bulk of the large canoes seen on the south-eastern coast at Motu-Motu, Port Moresby, Kerepunu, and in Milne Gulf, have no outriggers at all; while along the coast in small canoes, and in both large and small in the Louisiade Archipelago, the single outrigger is the prevailing form. It is the canoe indigenous to the region, and is undoubtedly not an introduced or imitated custom. The single outrigger in Torres Strait may be an imitation, but it is also a true New Guinea model.

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October 29, 1890.

Pectination.

I HAVE been somewhat disappointed to find that no one can suggest a better explanation of the pectination of birds' claws than that which I gave in NATURE of December 4, 1890 (p. 103). As this is the case, however, perhaps I may be permitted to add a remark to what I then said. It has been pointed out to me by a friend that the lateral position of the serration is not so disadvantageous for scratching purposes as I had imagined. While gladly admitting this—which removes a difficulty from the explanation—I still think that my observations must not be taken as conclusive.

It would be most useful and interesting if an observer could be found to give time and attention to representatives of the different orders of birds which possess this peculiarity.

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The Flight of Larks.

THE extraordinary flight of larks to which the Rev. E. C. Spicer refers was observed at Bournemouth. The birds appeared to come across the Channel in thousands, and in a few days had entirely disappeared. There were certainly some fieldfares among them.

ALFRED W. BENNETT.

PROFESSOR VIRCHOW ON THE CONSUMPTION CURE.¹

THE important communication made by the renowned German pathologist at the last meeting of the Berlin Medical Society is a severe shock to the opinions of those who expect that Koch's mysterious lymph will prove applicable in every case of consumption. Prof. Virchow gives the result of his observations on twenty-one cases that have died, after treatment with the lymph, up to the end of December. Since then, six or seven other cases have come under his notice, but have not yet been completely examined. Of the twenty-one cases, sixteen were phthisical. The remaining five included a case of joint tuberculosis; a case in which lung tuberculosis was accompanied with carcinoma of the pancreas; another had empyema; the next had pernicious anæmia, slight changes in the lungs, and tuberculous pleuritis; and, lastly, comes a case of tubercular inflammation of the arachnoid.

It appears, from an examination of these cases, that the lymph has an action on tuberculosis of internal organs similar to that which it has already been seen to exert on external portions of the body similarly affected. The signs of an intense irritation, such as redness and swelling, are very generally to be met with. An excellent example of this action is afforded by the above-mentioned

¹ Reported in the *Berliner klinische Wochenschrift*, January 12, 1890, p. 47.

case of inflammation of the arachnoid. Death occurred after the fourth injection, and Prof. Virchow has never seen so intense a hyperæmia of the pia mater and brain as this case presented. After careful examination no regressive changes could be found in the tubercular tissues.

The inflammatory changes met with in the various cases were not confined to a simple hyperæmia, which might possibly be regarded as of a transitory nature, but tissue changes which promised to be of a more lasting nature were also to be met with. The lymph glands near the affected parts, for instance, were found to be greatly enlarged. The increase in size seems due to a rapid multiplication of the cells in the medullary part of the gland—a change which is characteristic of acute irritations. This is probably connected with the increase in the number of white blood-corpuscles that has frequently been found to follow lymph injections, and this, again, with the frequent infiltration by leucocytes of affected parts and their surrounding tissues.

The changes produced in the lungs themselves belong to two widely different categories. Firstly, comes "caseous hepatization." That this can be actually caused by the injections is rendered highly probable by a very striking case, in which infiltration only commenced after the treatment had ceased, and led to a caseous hepatization of almost unique extent. Six injections had been made on this patient, of which the last was made four weeks before his death. Secondly, a "catarrhal pneumonia" is met with, sometimes alone, sometimes accompanied by the first-mentioned change. This form of pneumonia differs from ordinary catarrhal pneumonia in that it seems to lead to a rapid destruction of the lung-parenchyma, and a sort of cavity formation.

The most important conclusion that Prof. Virchow puts forward is that the formation of new tubercles which has been met with in many of these fatal cases must be ascribed with great probability to the action of the lymph itself.

The appearance of new tubercles has already been observed in lupus and tuberculosis of the larynx. Hitherto it has been asserted that the changes in question were merely due to the action of the lymph on tubercular material latent in the apparently healthy tissues. This view appears to be no longer tenable, at any rate as a general explanation. On serous membranes, which Virchow has always regarded as being best fitted for the observation of the early stages of tuberculosis, perfectly new sub-miliary tubercles have been found, under conditions which make it scarcely probable that they dated from an earlier stage of the disease. All these tubercles were perfectly intact, even in cases in which the injections had been made several weeks before. There was nothing to support the suggestion that these tubercles had been in any way affected or harmed by the action of the lymph.

How can this outbreak of new tubercles be explained?

In a phthisical case which terminated fatally, four small tubercles, surrounded by a zone of well-marked hyperæmia, were found situated on a part of the pericardium that could in no way come into contact with the lungs. In this case a direct infection was impossible, and we must suppose that, owing to the action of the lymph in breaking down the tubercular masses in the lungs, tubercle bacilli were thrown into the circulation, and thus reached the pericardium, where they succeeded in producing a metastatic infection.

In consequence of these and other similar observations, Prof. Virchow comes to the conclusion that the lymph should not be employed in cases in which one would expect some difficulty in excreting the tubercular matter set free by the treatment.

In forming an opinion as to the clinical bearing of these *post-mortem* appearances, it must be borne in mind that most, if not all, of these fatal cases were already in

an advanced stage before they came under treatment; and, from the practical point of view, Virchow's work merely adds to the evidence that is gradually accumulating in the Berlin clinics, of the unsuitability of Koch's lymph for advanced cases, at all events with the present methods of administration.

For other considerations arise besides that of the stage of the disease. Thus I have good reason for believing that Koch's treatment of consumption has been less successful at the Charité (in which hospital Virchow's twenty-one cases have occurred) than in the other hospitals and clinics of Berlin. It would be interesting to determine whether any difference in the details of the treatment at the various hospitals could help to explain the difference in the results. The quantities of lymph employed and the frequency of the injections are by no means uniform in the various hospitals. For example, the Charité and the Friederichshain appear to stand at the opposite ends of the scale in these respects. For the following details respecting these hospitals I am indebted to a friend, who during the last month has been studying the results in the various clinics. At the Charité the injections appear to be administered more frequently and with a more rapid increase in the size of the doses than is the custom in the Friedrichshain Hospital. Further, the largest dose administered to a patient at Friedrichshain seems almost always below that given at the Charité, whilst the average dose given at the latter hospital also seems generally larger. Naturally, it would be unwise to draw definite conclusions until the details of such a comparison have been thoroughly investigated, but whatever the explanation may be, I have good reasons for asserting that the results obtained at Friedrichshain have been far more favourable than those obtained at the Charité. Not only do the milder cases seem to have made better progress at the former hospital, but the severer cases have less often had a fatal termination.

It would thus appear as if the dosage alone has a considerable influence upon the results obtained, even in the advanced cases which alone are the subject of Prof. Virchow's animadversion.

E. H. HANKIN.

THE RESEARCHES OF DR. R. KÖNIG ON THE PHYSICAL BASIS OF MUSICAL SOUNDS.¹

III.

A FINAL proof, if such were needed, is afforded by an experiment, which, though of a striking character, will not necessarily be heard by all persons present, being only well heard by those who sit in certain positions. If a shrill tuning-fork is excited by a blow of the steel mallet, and held opposite a flat wall, part of the waves which it emits strike on the surface, and are reflected. This reflected system of waves, as it passes out into the room, interferes with the direct system. As a result, if the fork, held in the hand be moved toward the wall or from it, a series of maxima and minima of sound will successively reach an ear situated in space at any point near the line of motion, and will be heard as a series of beats; the rapidity with which they succeed one another being proportional to the velocity of the movement of the fork. The fork Dr. König is using is *ut*₆, which gives well-marked beats, slow when he moves his arm slowly, quick when he moves it quickly. There are limits to the speed at which the human arm can be moved, and the quickest speed that he can give to his fails to make the beats blend to a tone. But if he will take *sol*₆, vibrating 1½ times as fast, and strike it, and move it away from the wall with the fastest speed that his arm will permit, the

¹ By Prof. Silvanus P. Thompson. (Communicated by the author, having been read to the Physical Society of London, May 16, 1890.) Continued from p. 227.