

the Japanese are not liable to scarlet-fever, and the negroes are equally exempt from yellow-fever, if we could ascertain what condition it is that confers upon them this exemption, we might be able to take a long step in the direction of personal and general prophylaxis. There is no more vital question, none more attractive to the most active minds of the medical profession to-day, than this of immunity; and in the direction of ethnic immunity there lies a wide avenue for investigation promising to lead to results of the utmost utility to the health and welfare of mankind.

The Builders of the Great Zimbabwe Ruins.

Among the auriferous reefs of Mashona-land, in southwestern Africa, about 20° south latitude, are found a number of remarkable ruins of well-built stone cities, towers, and forts, which have long been an enigma to archæologists. Needless to say, they were not constructed by any Austro-African people; no negro or negroid race ever built stone walls voluntarily. The problem seems to be solved by the researches of J. Theodore Bent, which are published in the last number of the Proceedings of the Royal Geographical Society. He visited and explored the ruins of the largest city, called the Great Zimbabwe. This being a word of the local dialect, meaning krall or town.

His excavations show that these ruins were built and occupied by a people engaged in gold-mining. Crucibles and smelting furnaces were found, and in the vicinity "millions of tons" of quartz have been worked over. The stone work is massive, very firm, the stones often carved and decorated, and the sites usually of great strategic strength. Many images of birds, carved in stone, and also many phalli, in the same material, were unearthed. Pottery was abundant, the fragments often decorated with neat designs of animals, plants, and scenes from life. No coins were exhumed, and no inscriptions discovered, except some rude scratchings on a bowl, which resembled Ogham characters. What is significant, is the presence in the *débris* of Persian and Chinese Celadon pottery, which is not of very ancient date. Bent's conclusion is that the gold-seekers were Himyarites from southern Arabia, and that their settlements were destroyed by the savage Zenj from Abyssinia about the ninth century of our era.

Many consider this to be the Ophir of the Hebrews. An interesting visit to it, not mentioned by Bent, is described in the *Verhandlungen* of the Berlin Anthropological Society for 1889, carried out by a young German named Posselt. Both accounts present engravings of carved stones, figures of birds, etc.; but it is singular that neither explorer could find a single grave or skeleton of this ancient people.

THE PROPER MOTIONS OF THE STARS.¹

BY W. H. S. MONCK.

SOME time since I pointed out in the columns of the *English Mechanic* the great preponderance of proper motions in diminishing right ascension in certain catalogues which I examined. I have now examined O. Struve's great Pulkova Catalogue, which contains the proper motions of nearly 2,500 stars, with a similar result. About two-thirds of these motions are in decreasing right ascension. I suspect that the sidereal year has been under-estimated by a small fraction of a second, in consequence of which a star whose proper motion is really insensible appears to have a small motion in decreasing right ascension. The effect of

the sun's motion in space is very evident in the Pulkova Catalogue. The right ascension of the apex of the sun's way (the Americans use the shorter term, goal) may be roughly taken at 18 h. The effect will be to produce an apparent motion in diminishing right ascension on all stars between 6 h. and 18 h., and an apparent motion in increasing right ascension on all stars between 18 h. and 6 h. Diminishing right ascension predominates in both cases, while in the latter the excess is only about 20 per cent.

I noticed, however, a curious fact as regards the motions in North Polar distance. The sun's motion produces an apparent increase in North Polar distance in all parts of the sky save the portions situated between the apex and the North Pole on the one hand, and between the antapex and the South Pole on the other. But taking the right ascension of the apex at 18 h., as before, the motions in North Polar distance ought to be symmetrically situated between 6 h. and 18 h. and between 18 h. and 6 h. But this is not the case. Between 18 h. and 6 h. the proportion of increasing to diminishing North Polar distances is two to one, while between 6 h. and 18 h. it is only about four to three. It occurred to me that this difference might arise from some special drift in the stars of the Galaxy, of which a comparatively small number lie between 6 h. and 18 h. in the Pulkova Catalogue, which deals chiefly with northern stars. I accordingly tried Mr. Stone's "Catalogue of Southern Stars," which so far verified my conjecture. The great preponderance of increasing North Polar distances in it lie between 6 h. and 18 h., and the relative proportions are not very different from those in the Pulkova Catalogue reversed. Further examination will be necessary to clear up the question; but I venture to suggest that the Galaxy has a southerly drift relatively to the majority of the non-Galactic stars, and that we would obtain different goals for the sun from the Galactic and the non-Galactic stars.

May I add that in dealing with the fixed stars our present unit of distance—a year's light-passage—seems to me inconvenient. Besides the advantage of having a space unit instead of a time unit, and the existence of some little uncertainty as to the rate of propagation of light; we must recollect that our standard of measurement is the distance of the sun from the earth. The time occupied by light in traversing this distance is uncertain to the extent of at least two or three seconds, and the difference becomes considerable when we are considering very remote bodies. I venture to suggest as a better unit the distance of a star having an annual parallax of $1''$. This distance is 206,265 times that of the sun. The distance of α Centauri on this scale is about 1.33 and Sirius about 2.5. We should seldom, if ever, have to use numbers as high as 1,000, and the reciprocal of the parallax expressed in fractions of a second would in all cases give the distance.

THE PEAR-TREE PSYLLA.

BY J. A. LINTNER.

UNTIL within a few years the pear-tree has been remarkably free from insect attack, the amount of injury from such source being probably less than five per cent of that to which the apple has been subjected. Recently two pests have forced themselves upon the notice of pear growers, which have already inflicted serious losses, and threaten, unless arrested, greatly to interfere with the cultivation of this most excellent fruit. Of these, the pear midge, *Diplosis pyrivora*, which was introduced in this country about the year 1880,

¹ From the *English Mechanic*, May 27.