these fungi may assist in the destruction, no proof was obtained that this took place without the presence of Macrosporium and Stemphylium. The fungi grew well on Sabouraud's medium and on ordinary agar.

According to the author, the first signs of fungoid growth appear on the inner side of the roof portions of tents and marquees. Often within three months pressure on the spots made by the fungi leads to perforation, or a strong wind causes tearing.

Cotton and linen duck-canvases ready for tent-making were examined, but, though the flax fibres were in good condition, brown mycelium was found more or less in abundance. It is suggested that the fungi reach and begin growth during the retting of the flax, though they may be present on the growing plant. Mycelium was not found on new cotton-made canvas, and "this is not surprising when its method of preparation is studied." It is not, however, probable that the infection of linen canvas is restricted to the period of retting. Guéguen (NATURE, vol. xcix., 1917, p. 206) was of the opinion that fungi from the dead stems of the textile plant were introduced amongst the fibres. This might account for their absence from new cotton-made canvas, but there is little doubt that both linen and cotton canvas often become infected after having been made up.

Experiments showed that the Willesden (cuprammonium) method and cutch treatment prevented the growth of the fungi. A method suggested by Prof. Pinoy (soft soap 1 in 5000 solution, followed by a mixture of 1 per cent. of alum and $CuSO_4$) greatly inhibited the growth, and its extended employment in Malta gave very satisfactory results. Mango-treated canvas was in no way inhibitive.

No mention is made as to whether the "cutch" was the ordinary commercial cutch (product of Acacia, etc.) or whether it was sodium chromate, which was used in certain areas. In Salonika this was found the best preventive for "diamond spot" on comparison with Guéguen's and Pinoy's treatments, and was at the same time a satisfactory camouflage.

J. RAMSBOTTOM.

The Economic Pursuits of the Trobriand Islanders.

AT a meeting of the Royal Anthropological Institute held on Tuesday, June 1, Mr. S. H. Ray, vice-president, in the chair, Dr. B. Malinowski read a paper on "The Economic Pursuits of the Trobriand Islanders." In his opening remarks Dr. Malinowski criticised the methods usually followed by observers in dealing with the economics of primitive peoples. Whereas it was usually held that such peoples were preoccupied solely with obtaining an adequate individual food supply, he had found that, at any rate among the peoples which had come under his observation, there was a highly complex economic organisation. In support of his view he described the economic system of the natives of Kiriwina or the Trobriand Islands, lying to the north of easternmost New Guinea. These natives are very efficient and industrious tillers of the soil. Agricultural production is highly organised, being based upon two social forces: the power of the chief and the influence of magic. The chief is overlord of the garden-land, and initiates in each season the allotment of garden-plots to individuals and settles any disputes about garden-land; he finances any communal work to which the natives resort when clearing the bush, planting the yams, and bringing to the gardens the big, heavy poles used in connection with magical rites. On the other hand, the traditional garden magician controls the detailed proceedings of the work and performs magical rites at each stage.

There are several customary forms of communal work. An interesting institution of ceremonial enterprise, called *Kayasa*, is applied to gardening, fishing, oversea expeditions, and industrial activities, as well as to tribal sports, games, and dancing. Such a period of communal work is announced by the chief, who gives a big feast, which is followed during the continuation of the work by periodical distributions of food. Fishing, the building of houses and canoes, and other economic activities are based upon organisations similar to that of gardening. All are dependent upon the social power of the chief and the influence of the respective magician.

The distribution of the products is as highly organised as the production. The producer receives a certain portion, but a considerable part is used for the financing of big tribal enterprises through the chief, and another part is transformed into permanent wealth. By various tributes, dues, and offerings the chief collects about 30–50 per cent. of the tribal wealth, and he is the only member of the community who is allowed on a large scale to transform it into permanent wealth. This he does by keeping a number of industrial workers dependent on himself, who, for payment in food, produce polished "ceremonial" axe-blades, neck-strings of red shell discs, and arm-shells made of the conus shell, which are of very high value in the eyes of the natives, form the foundation of certain kinds of native trade, and are an indispensable feature of the social organisation of the natives. Every important transaction, whether ceremony or magical rite, birth, death, or marriage, has to be accompanied by gift and counter-gift. These are arranged, as a rule, so that while one party gives a substantial present of food, the other offers one of the tokens of native wealth, such as a ceremonial axe-blade, an arm-shell, or a string of shell discs. The powers of the chief are largely exercised through economic means. In inter-tribal affairs the chief backs up with gifts his summons to arms of his vassals, and the conclusion of peace after hostilities; and the same method of remuneration was followed when, in his narrower jurisdiction, direct punishment was meted out by ordering a special henchman to kill the offender or by calling upon a sorcerer to cast an evil spell on the victim. In both cases payment for the service was made in native tokens of wealth. These tokens of wealth have sometimes been designated by the term "money," but rather they represent stored-up wealth. Although a basketful of yams, a set of four coconuts, or a bundle of taro is, to a great extent, the common measure of value, there is no article among these peoples which, properly speaking, fulfils the function of a medium of exchange.

Two of these tokens of wealth, the arm-shells and the necklaces of shell beads, are used for a remarkable form of trade, called by the natives *Kula*, which embraces a ring of islands and archipelagoes lying to the east and north-east of British New Guinea, in which these two articles circulate in opposite directions. They are constantly being exchanged, scarcely ever being put to any use, but returning after a few years to the same district whence they were originally sent out, and then being traded again. The exchange is of a highly formal and ceremonial character, based on mythological tradition, and carried on according to very complex and rigid rules. Extensive and daring oversea expeditions in big sea-going canoes are made year after year, mainly in order to carry on this exchange. It involves a singular form of ownership, by which a token of wealth never remains in the hands of one man for any length of time. Instead of owning one article permanently, he owns a great number of articles temporarily. As a result of this

investigation it would appear that chieftainship, kinship, and social organisation in general are intimately bound up with the economic organisation.

In the discussion which followed the reading of the paper all the speakers emphasised the value and originality of the view of primitive culture which Dr. Malinowski had formulated in his interesting communication. Prof. Seligman asked how far the elaborate organisation of garden cultivation depended upon the existence of the chieftainship. Among the Southern Massim of New Guinea, for instance, there were no chiefs, and the native social organisation was based upon the hamlet. Had the elaborate garden organisation been observed among such peoples?

Sir James Frazer agreed that the economic aspect of primitive culture had not been adequately studied. It was interesting to note how the tribal economics were saturated with magic, and how the fallacy of magic still persisted among people who had developed a high system of agriculture. The mention of torches used by the magician in the ceremonies led him to compare the torches to which reference was made in the Greek legends of Demeter's search for Persephone. Was it possible that these torches represented a survival of a use of torches in early Greek agricultural ceremonies similar to that to which they were put in the Trobriands?

Mrs. Routledge suggested that an analogous complexity of economic organisation might be found among the people of East Africa with whom Mr. Routledge and herself had come into contact, where ivory played an important part.

Mr. Ray said that Dr. Malinowski had submitted a new view of ethnological investigation to the institute. Some of the ceremonies described by him suggested ceremonies from the other end of Melanesia, namely, Loyalty Island and New Caledonia, where the agricultural operations were directed by the chief, who prescribed what ground should be put under cultivation, the kind of crop, and the like, and received the first and best of the produce. Was it possible that these complex economic systems existed wherever there were chiefs whose position, power, and prerogatives depended upon the fact that they were of extraneous origin?

The lecturer in his reply stated that although garden magic was carried out by the Southern Massim at Dobu, cultivation was not accompanied by such a complex organisation for distribution.

The Organisation of Scientific Work in India.

THE Indian Industrial Commission during its tour through India found that all was not well with the scientific worker, especially in connection with the application of his work to industrial development. While stating specifically in its report that "we do not propose to deal with the general problems of pure scientific research," it adds: "We were impressed by the value of the work which had already been done in the organised laboratories, and by the absolutely unanimous opinion which was expressed by all scientific officers as to the inadequacy of the staffs in point of numbers. Everywhere we were brought face to face with unsolved problems, requiring scientific investigation on an extended scale. On the one side, we saw the results accomplished by enthusiastic scientists, which, regarded from the purely economic aspect of the question, have added enormously to the productive capacity of India; on the other side, we were told by forest officers, agriculturists and indigo planters, engineers, and manufacturers, of the limitations placed upon the development of their work and the frequency with which they were brought to a standstill by a lack of knowledge regarding matters which could only be ascertained by systematic research work." It is clear from these and other passages that the Industrial Commission desired to direct attention to the necessity for the elaboration of some scheme by which an organised attack might be made on the large number of problems awaiting solution in connection with the development of industry, and the conclusion reached is that "the maintenance of a staff of suitable technologists and scientific experts is essential to industrial development."

The Commission then gives its reasons for considering that it is the duty of the State to provide the necessary facilities, and concludes: "We have thus no hesitation in recommending a very substantial increase in the scientific and technical services as essential to industrial development." A general discussion follows as to the relative merits of a system in which the science is the bond, and one in which the bond is formed by the application of the sciences dealt with. In the first case the Geological Survey is given as an example, and the Agricultural and Forest Departments are quoted as examples of the second. But it is clear that the Commission was fully alive to the difference between a service and a department, and realised that the differentiation given above was the same as that between a service and a department, because it says: "The constitution of a certain number of scientific services based on the assumption that the science itself is a chief link between all members does not prevent the formation of departments, either Imperial or provincial, where the application of various sciences is the chief bond of union." The essential difference between the two types of organisation is clearly indicated in subjoined extracts from a despatch of the Government of India.

The Commission states that its proposals in the case of chemistry will have to be submitted to a special committee, and that it "hesitates to offer suggestions in greater detail regarding the organisation of the Imperial scientific services for bacteriology, botany, and zoology, as we consider that the best plan will be the appointment of special small committees for the purpose of formulating proposals." The first of these, that for chemistry, has now reported, and the report is open for discussion. As regards other sciences, it would be best to await the reports of the other committees before offering any remarks upon them.

The following extracts from the Government of India's dispatch dated June 4, 1919, place in a very clear light the intentions which underlie the recommendations of the Commission:—

The Scientific Services.

One of the main proposals refers to the constitution of scientific services and of an industrial service. The Commission direct attention to the extreme importance of research under modern industrial conditions, and to the especial needs of India, in view of her vast unexploited resources in raw material and of the paucity of her scientific workers. They criticise the complete lack of organisation among men of science employed by the Government, and describe the difficulties, both administrative and technical, to which this gives rise. The Commission recommend as a remedy the creation of a similar mechanism to that through which the Central and Local Governments have hitherto carried out almost all their most important activities, especially those requiring technical knowledge, viz. all-India services; and they discuss the basis on which these services should be con-