personnel, under the chairmanship of the Honorable Member for Planning and Development: Sir C. V. Raman, Sir Jnan Ghosh, Professor Megnad Saha, Dr. Nazir Ahmad, Colonel Sir Ramnath Chopra, the Master-General of Ordnance, the vice-chairman of the Imperial Council of Agricultural Research or the Agricultural Commissioner to the Government of India, the Director-General, I.M.S., the director of the Geological Survey and the director of Scientific and Industrial Research. The functions of the committee will be to advise the Government of India on all general questions of policy relating to research which may be specifically referred to it.

THE thirtieth annual meeting of the Optical Society of America will be held at the Hotel Pennsylvania, New York, on October 18, 19 and 20. Should the present Federal restrictions be still in force in October, the meeting would be of local character, and New York City was selected because of the large number of members who reside within the ordinary commuting zone. Attendance from outside the regular commuting zone will be limited to fifty members, in conformity with the definition of a local meeting established by the War Committee on Conventions. In preparation for a meeting of this type, it is proposed to establish a "priority list," giving preference in turn to officers of the society, invited speakers, authors of abstracts submitted for the Cleveland meeting, which was cancelled, authors of abstracts for the October meeting and the membership at large.

THE Pittsburgh section of the Electrochemical Society will sponsor a symposium to be held on May 25 at the Mellon Institute. The subject will be "Polarization and Passivity." The speakers will be Dr. A. Langer, Dr. R. T. Phelps and Dr. E. A. Gulbransen, Westinghouse Research Laboratories; Dr. K. Graham, Graham and Crowley and Association, Inc.; Dr. P. T. Stroup and Dr. R. B. Mears, Aluminum Company of America, and Dr. H. Uhlig, General Electric Company. The meeting will be open to Pittsburgh members of the American Association for the Advancement of Science.

UNDER the joint auspices of the Polytechnic Institute of Brooklyn, the Society of Rheology and the Metropolitan Section of the American Physical Society, a one-day conference will be held at the Polytechnic Institute on June 2 on "The Ultracentrifuge in Highpolymer Research." James Burton Nichols, head of the Section of Physics and research chemist of the Experimental Station of the du Pont Company, will preside at the conference. The speakers will be Professor J. W. Williams, of the department of chemistry of the University of Wisconsin; Professor Charles Beckman, of the department of chemistry of Columbia University, and Dr. Kurt G. Stern, of the Highpolymer Research Bureau of the Polytechnic Institute.

Nature states that owing to the generosity of the Rockefeller Foundation of New York, which has for a fifth year in succession provided a grant for the purpose, the Royal Society is in a position to give assistance to scientific societies and associations which, as a result of war conditions, are experiencing financial difficulties in the publication of scientific journals.

SIR WILLIAM HENRY COLLINS, chairman of the Cerebos Salt Company, has made a gift of £100,000 to the Royal College of Surgeons for the endowment of the department of anatomy and for the establishment of a chair of human and comparative anatomy. Last year Sir William gave £100,000 to endow a chair of pathology. The museum and research departments have been damaged during the war. Their maintenance, however, is now assured by the gift, and the college can proceed with its rebuilding plans.

THE International Telephone and Telegraph Corporation has announced the formation of a new organization with an initial capital investment of $2,000,000 to coordinate more closely its electronic research, including advancements in radio, television and related fields of communication and aerial navigation. The company has been incorporated under the laws of Delaware, with headquarters at Nutley, N. J. E. M. Deloraine, director of the Federal Telephone and Radio Laboratories, has been made president.

DISCUSSION

COMPARATIVE SCIENTIFIC STRENGTH OF UNIVERSITIES

THE recent note by Visher[1] on comparative university strength in scientists starred in "American Men of Science" properly defines its procedures and includes a faint note of caution. It is probable, nevertheless, that many readers will take the data of that note as indicative of the relative scientific faculty strength of the listed institutions. Visher's wording does encourage this interpretation, and this would seem to be the principal reason for making such a tabulation. In fact, such an interpretation is highly unreliable and leads to serious errors in rating of scientific faculties and consequent grave injustice to some of the universities involved.

In the first place, the basic but unstated postulate that starring in "American Men of Science" is a reliable criterion of scientific ability or eminence is

[1] Stephen S. Visher, SCIENCE, 101: 272–273, 1945.

itself open to considerable doubt. It may, however, be granted to be a convenient criterion and probably sufficiently reliable for obtaining an approximate average.

A second point, more important than the first, is that the tabulation includes only scientists first starred in 1933 or later. Obviously a faculty all the members of which were starred before 1933 might now be considerably stronger than one with a high percentage of members first starred in 1944, even though it might have less prospect of enduring eminence. Valid figures for present strength should certainly include all starred scientists now active on the various faculties, regardless of when they were first starred. Even if the intention were to estimate probable future eminence of faculties, the criterion of recent starring would be poor, because age at starring is highly variable and younger men, particularly, often move after being starred.

Most serious of all is the fallacy of taking Visher's column III as an index of "average scientific faculty strength," as Visher seems to invite the reader to do. This column gives the percentage of recently starred scientists in the total faculty. Since only scientists can be starred and since the proportions of scientists (starred and unstarred) on the various faculties are radically different, these figures are completely unreliable as a basis for comparison. For instance, the figure in column III is 1.4 per cent. for Columbia University and 14.3 per cent. for the California Institute of Technology. Without myself attempting a comparison on inadequate data, I venture to claim that the California Institute of Technology has nothing like ten times as strong a scientific faculty as Columbia. At California Institute of Technology most of the faculty consists of scientists eligible for starring. At Columbia only a small proportion of the faculty consists of scientists. The most nearly valid means of comparison would, of course, be based on starred scientists and total *scientists,* not on starred scientists and total faculty. (Both absolute and relative numbers should, of course, be taken into consideration; a faculty with three scientists, 100 per cent. starred, is obviously not as strong as one with 50, only 10 per cent. of whom are starred.)

The rating by number of alumni starred in or after 1933, given in columns IV–VI of Visher's note, is subject to the same grave objections plus at least two more faults. Here, too, only recently starred scientists are included and the percentages given are based on total numbers of male college students and not, as they should be, either on the numbers majoring in science or the numbers who became professional scientists. An additional pitfall here is that such a figure, even if on a more valid basis, would not measure present scientific strength of the institution, or strength at any time in the past, but only a rough sort of average for the prolonged period during which scientists destined to be starred in 1933–1944 were being graduated.

Moreover, if these figures for students are to be considered as having any bearing on comparison of the institutions in question, it must be postulated that the institution contributed significantly to the subsequent starring of its students. Such a postulate can be accepted (and then with some reservations) only if the student received his *professional* training at the given institution. Especially in the period in question, most scientists received their professional training in graduate schools. But the figures given are for male undergraduate enrolment in non-professional colleges and for subsequently starred scientists who received their college degrees (evidently their first or bachelors' degrees, not the doctorate) in these institutions. There are one or two other equivocal points, but this, in itself, is enough to brand these figures as completely valueless for any comparison of the scientific strength of the institutions or of their relative success in training scientists.

Neither the data on faculties nor those on students in the note cited should be taken as a basis for comparing the strength or teaching value of the scientific departments of our universities.

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THE EFFECT OF MOTION PICTURES ON BODY TEMPERATURE

IN the course of an extended study of the variations in the diurnal body temperature cycle, which required ten oral temperature readings per day, it was found that after attending a two- or three-hour commercial motion picture show the subject's temperature was higher than usual for the particular time of the day. Sitting for that length of time under laboratory conditions almost always led to a distinct fall in body temperature, an expected result of muscular relaxation.

To get reliable numerical data, body temperature figures were gathered on two female subjects. The first, a teen-aged girl, attending motion picture shows in the afternoon, every two or three weeks, over a period of over two years, furnished 55 "movie" body temperature readings of 99.00 to 100.15° F, with a mean value of 99.59. Temperatures taken at the same time (about 4 P.M.) on 57 days preceding or following "movie" days, ranged from 97.95 to 99.70, the mean being 98.66° F or 0.93° lower. Another way to treat the temperature figures was to compare the difference between afternoon and basal (getting-up time in the morning) temperatures obtained on

control and on "movie" days. The mean rise in temperature in 54 control days was 0.73°, while the corresponding value for 45 "movie" days was 1.69°. The differential rise on "movie" days was 0.96°, about the same as 0.93° obtained by direct comparison, with a t value of over 14 (using Fisher's method of statistical evaluation of significance) or one possibility in trillions that the difference was due to chance.

The second subject, a young lady in her early twenties and a "movie addict," attended motion picture shows 29 times in the course of two months, viewing 47 feature films, mostly in the evening, in many cases taking two temperature readings, at 8 P.M. and 10 P.M. Twenty-two 8 P.M. "movie" figures varied from 99.0 to 99.65, with a mean value of 99.42, while 30 corresponding control temperatures fluctuated between 98.40 and 99.40, with a mean of 98.95. The difference, 0.47° F, was highly significant (t value of 6.24), and the chance of its being gratuitous is one in a billion. Here, too, comparing the differences between the basal and 8 P.M. temperatures in a larger series, the mean rise on 83 control evenings was 1.15°, that on "movie" evenings 1.68°, a mean differential of 0.43° being about the same as by direct comparison (t value of 7.28). In this subject the 10 P.M. temperature readings, taken usually at the end of the second feature film, were lower than the 8 P.M. values, the mean of 24 "movie" measurements being 98.91, while 28 control evenings gave a mean level of 98.66, the difference of 0.25° being just on the borderline of significance (t value of 2.65). It appears that either the body temperature raising effect of the second feature was less than that of the first, or that the normal diurnal fall in body temperature late in the evening was too strong to be completely reversed.

In summary, on the basis of occasional data obtained on many subjects, male and female, and through an analysis of multiple readings on two female subjects, it appears that attending motion picture shows, though looked upon as "relaxation" in the sense of escape from the humdrum reality of existence, *is by no means relaxation in the physiological sense.* On the contrary, although the spectator remains in a sitting position for two or more hours, the subject-matter of the film evokes an increase rather than a decrease in muscle tension which manifests itself in a highly significant rise in body temperature of one-half to one degree F. It remains to be seen whether the collective change in the body temperature of a preview audience can be used to predict the box-office success of a film.

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GROWING RUBBER IN COSTA RICA

A PECULIAR paradox of the agricultural economics of Caribbean countries is the high population density and scarcity of agricultural land in the highland areas, while down in the coastal plains there lie tremendous expanses of flat lowlands which for centuries have waited for development. Some people have thought that the populations prefer the highlands because of climate and health factors, but closer inquiry will reveal the main factor to be primarily economics. Tropical lowlands can produce basic foodstuffs like corn, rice and beans, but no one has yet found a permanent export cash crop capable of providing the economic base that is essential for an integrated community growth. Bananas have been tried in spots, but it wears down the soil too fast for permanent communities to really develop. And thus we have gross waste of soil resources in the midst of an acute scarcity.

This problem, which has baffled statesmen for over a century, now promises to be solved, thanks to the efforts of the U. S. Department of Agriculture Rubber Field Station at Turrialba under the leadership of Dr. Theodore Grant. The first thing found was that by a process of cross-breeding it was possible to develop varieties of *Hevea brasiliensis* combining high rubber yield with resistance to fungus attack. Then Dr. Grant convinced a group of scattered small farmers that they could develop rubber plantings of their own by just putting a little spare work over that required to raise their marginal food crops, and letting the station provide the technical knowledge and the planting material at nominal cost. And thus a practically self-sustaining system of rubber cultivation was initiated at very low cost, and without the complications inherent to large corporate organizations, which have never been able to understand, or be understood, by the average Caribbean native.

The small-farm rubber program as developed by Dr. Grant fits nicely into the general scheme of tropical life because it provides a simple system by means of which the average marginal farmer of the lowlands can gradually build himself a definite source of cash income without interfering with his food-raising activities. And the fact that rubber is a permanent crop will encourage the people to stay put in one place and to evolve gradually into integrated communities instead of being mere transient squatters. In other words, rubber bids fair to provide to the tropical lowlands the same type of economic stabilization that the cultivation of coffee has provided to the highlands.

At the present moment there are only seventy-five small rubber farms in Costa Rica, with an average area of around one or two acres each, but the impor-