

We never found a means of really breaking down the barrier between works and office on the social side—a stupid distinction which in reality was non-existent—for the many offices in the works counted as works staff and played with us. Perhaps we did not try hard enough and left the office folk to find out what they were missing.

Health. The health of the worker should be a matter of concern to management. Quite apart from occupational diseases and epidemics, undue sickness in any one department is a sign that something is wrong and needs investigation. Departmental as well as general statistics should be reported. An undue amount of sickness among the girls led to the discovery that in order to get to work in time in the morning, many of them neglected to have a proper breakfast. A 40-minute-later start, that is, a 44- instead of a 48-hour week, was tried as an experiment, with an agreement on the part of the workers that they would try to maintain output and on ours that they would not lose pay. When things had settled down, it transpired that in the long run a slightly larger output was obtained and the sickness figure fell considerably. A watch on the sickness figure of small sections usually led to the discovery and rectification of the cause.

Many sections of the firm were working under conditions of limited floor space while new buildings were under way. Increased demand could not therefore be met by putting on extra girls, but only by higher production from the pieceworkers. To this end we made what are now called motion studies, an operation requiring the greatest tact. Varying rest periods, change of work so as to bring another set of muscles into play, height of seat and accessibility of components were all studied, with the result that we were satisfied that we did obtain the highest output per girl (paid for as piecework) that could be kept up day by day for a number of weeks. On one occasion the opportunity presented itself of working in circumstances in which the same girls, at their own wish, did even more, working for three days only per week. They kept this up for two weeks and then asked to give it up; the strain was too great and they found themselves tired for the rest of the week.

Overtime should be sparingly used for young persons; older men like it to provide a bonus for holiday occasions, but in the long run the same amount of work was done as if only normal hours had been worked.

Motion study under a special officer is to-day a regular practice, and much can be done to make the work easier. On the whole, operatives like monotony, something they can do with their fingers mechanically while they chatter and sing. They are suspicious of change unless they feel they have absolute confidence in the fair dealing of the management, and in particular a right of personal appeal to the top.

One of the most difficult things is to get hold of ideas from the workers to improve the process. There is the fear that the foreman will annex it as his own, or that if one goes past him that he will take it out of the individual. Suggestions boxes too often contain claims regarding alterations which the engineers already have in hand. The more management at the top knows the work-people, the easier it is to get a hint here and there where the shoe pinches, and to take equally quiet methods to put the trouble right.

Our wages were a few shillings above the local

average, so that living on the same scale our people were just that amount better off. They were extraordinarily generous, as English working-people are, giving freely to help fellow-workers in adversity and to causes sponsored by us which commended themselves. Perhaps I should say that all this was largely before the advent of the cinema, which has done so much to absorb the loose shillings from the people's pockets.

We were always seeking methods of giving extra benefits to the work-people, partly as a means of profit sharing, partly to shield them in adversity, and partly also with the hope of retaining our labour and not having constantly to take on new people. This aim was achieved, for our labour turnover was one of the lowest in Great Britain. We were early in the field in granting holidays with pay, depending only on good time-keeping. We gave a weekly wage bonus for length of service. We started pensions depending on the will of the board—non-contributory because any fund on an actuarial basis would have been too costly. We postponed co-partnership because of fluctuating profits—workmen do not like the years in which no dividend is paid.

Perhaps our greatest success was group life insurance—every man of long enough service was given a policy for a year according in amount to his standing and the report on his general proficiency. The minimum was £100, and many workers had twice this. The realization by the married man that if anything happened to him his wife and children would receive what seemed a large sum—enough to start a small shop and keep them from want—had a profound effect on his well-being. The cost was considerable, but I am sure we should have been amply repaid.

Perhaps what has been said is enough to portray a restless management always seeking to make work happier for all and to better the lot of the worker both at work and at home. A loyal band of helpers found zest in the cause while our reward was close at hand. Needless to say we had no strikes, a very minimum of friction in spite of the fact that externally the years were very difficult ones, and a loyal response to any extra effort for which we asked.

The function of management *vis-à-vis* the worker is necessarily to drive, but when both sides understand each other, 'drive' becomes largely 'guide'.

E. F. A.

PHYSICAL FEATURES OF COMET 1941c (DE KOCK)

R. H. STOY has described (*Mon. Not. Roy. Astro. Soc.*, 101, 7; 1941) the chief physical features from an examination of 24 plates taken with the Cape astrographic refractor on 18 days between January 20 and March 6. The plates were projected on to a piece of paper with the aid of an enlarging lens and a 500-watt lantern, the main features of the comet being then sketched in. The orientation of the drawing and position angles were derived from the lines, the positions of which were known, and when these had been completed an attempt was made to match the outlines of the observed caps by known curves.

It is interesting to notice that in nearly every case it was possible to find a catenary that fitted satisfactorily. There was a remarkable similarity between

the early appearance of this comet and Donati's Comet of 1858. Thus, Donati's Comet showed a dark division between the two principal tail streamers, and this feature was very pronounced in 1941c. The envelopes or caps were also very similar in both comets, and the shapes of most of these could be very satisfactorily represented by catenaries. In all these cases the departure from a catenary was in the sense that the observed curve was less divergent near its open end than was the catenary that fitted it best near its vertex.

This departure should indicate that the velocity of outflow from the nucleus of the matter forming these envelopes was steadily increasing, on the fountain theory of the formation of these caps, outlined by Eddington in *Mon. Not. Roy. Astro. Soc.*, 70, 442 (1910). It is remarkable, however, that the linear size of the caps did not increase from day to day, as would be expected on the fountain theory, which indicates that the velocity of outflow from the nucleus of the matter forming the envelopes should steadily increase. From January 20 until 28, the date of perihelion, the inner caps grew brighter as they got smaller, but there is not the same amount of evidence available for the outer caps. What there is shows that these outer caps seem to have remained much about the same size, or in some cases to have expanded slightly before starting to contract.

A full description is given of the phenomena visible on the plates for each day when photographs were taken.

FIDDLER CRABS

JOCELYN CRANE has made important and interesting observations on these crabs ("Crabs of the Genus *Uca* from the West Coast of Central America." Eastern Pacific Expeditions of the New York Zoological Society. XXVI. *Zoologica*, 26, Part 3; Oct. 31, 1941). The present paper deals with specimens taken on the *Arcturus* Oceanographic Expedition (1925), on the Eastern Pacific *Zaca* Expedition (1937-1938) and on a special trip made to the Pacific shores of Panama by Miss Crane herself in January and February 1941.

The studies of habits and behaviour made on this last trip embrace a large amount of new knowledge on the ecology and especially the courtship display and mating of these crabs. Twenty-seven species are accurately described, eleven being new to science. There have been different opinions about the meaning of the waving of the large claw in fiddler crabs, but it is quite definitely established by these observations that this waving of the large claw, at any rate in the region investigated, is primarily for the attraction of the female, at least during the breeding season, and only secondarily for the warning off of crabs trespassing on a male's feeding range. This waving is only a part, or step, in a definite courtship display or dance which varies so greatly with the species that individuals can be recognized at a distance by their characteristic motions.

The patience which such studies necessitate is enormous, whole periods between tides being utilized and individual crabs kept under observation for many hours. The quality and quantity of the results show that such patience is amply rewarded, and Miss Crane is to be congratulated on the completion of a valuable contribution to the study of crab

behaviour. Detailed colour notes are also given of all the crabs described; these colours vary enormously at the breeding season and at the time of display. "Courting adult males, in contrast to other adult males, and, of course, to females and young, change colour daily upon exposure to sunlight within the space of a short time—a few minutes to an hour or more being required. . . . That courtship coloration and display play a definite part in sexual recognition is certain, that they play one also in sexual selection is likely, but has not yet been proved by experiment."

A phylogenetic tree of the species dealt with is suggested and a key given to the species of *Uca* occurring on the west coast of America and in the Galapagos Islands.

NATIVE SUBSISTENCE ON THE AMERICAN CENTRAL PLAINS

IN a recent paper, W. R. Wedel dealt with man's battle against Nature in the great plains of Kansas and Nebraska (*Smithson. Misc. Coll.*, 101, No. 3: "Environment and Native Subsistence Economics in the Central Great Plains". Publ. 3639. Pp. ii+29+5 plates. Washington, D.C.: Smithsonian Institution, 1941.) This region of widespread droughts, dust-storms, and consequent crop failures has been for some centuries the scene of attempted cultivation—sometimes successful, sometimes not. In view of recent failures the author has been collecting archaeological evidence which tends to show that the aboriginal groups that exploited this region at various times and in various ways were themselves faced with similar adverse climatic conditions. In the western portion of this territory lies part of the High Plains province and immediately eastward of this is a stretch of sandy country now used for cattle rearing as the loose sandy soil renders it impracticable for agriculture on a large scale. Before the advent of the white man all this portion was roamed over by herds of bison, followed by nomadic tribes of Indians who preyed on them and on other abundant game. But farther east there is the great loess plain, fertile and well suited to agriculture and which was formerly inhabited by groups of Indians who cultivated the soil and made semi-permanent settlements. That these never became permanent was probably owing to the recurrent bad seasons—mainly droughts—that then, as now, might last for some years.

Archaeological evidence goes to prove that groups of people did succeed at times in wresting a living even in the more inhospitable zones of the dry belt; as proved by sites containing the remains of charred corn and bone hoes, together with such quantities of animal bones as suggest that hunting was the main economy and horticulture a side line. In these circumstances the vagaries of the weather would play a less important part than in a wholly agricultural community. Droughts undoubtedly occurred in prehistoric times, the dust storms that accompanied them forming deposits over the sites.

In historic times great droughts occurred causing large population movements of the white settlers and reducing the Indians to the borderland of starvation. But it must be borne in mind that the old cultural patterns of the Indians were already broken by