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 archæological 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.

Archæological 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