

ONE HUNDRED NEW DOUBLE STARS.—Dr. Aitken continues his publication of newly discovered double stars in No. 223 of the Lick Observatory Bulletins. The present list contains the data for 100 objects, all measured with the 36-in. refractor, and brings the total now discovered up to 2500; of these only seventeen have distances greater than 50", while in 1847 the components were separated by less than 2.0". The original programme included the examination of all stars down to the ninth magnitude, given in the B.D., from the north pole to -22° declination, and 95 per cent. of the area to -14° has now been surveyed; of the remaining area, -14° to -22° , only about one-quarter remains to be examined.

CONTRIBUTIONS TO AMERICAN ECONOMIC GEOLOGY.¹

THE State of Texas consists mainly of plains of Cretaceous and Cainozoic rocks which slope gradually eastward to the Gulf of Mexico. They are interrupted to the north-west of the city of Austin by an outcrop of pre-Cambrian rocks composed of granite, gneiss, and schist, and of some early Palæozoic sediments, including Cambrian and Ordovician. These older rocks of Texas have been described in a bulletin by Mr. Paige, who has proved that they have been faulted up into their present position. These old rocks contain some iron ores, of which the Survey during its work in the region discovered thirty-two occurrences. Only three are sufficiently large to be of economic importance, and their value is still unproved. The ores are masses of magnetite; they occur in the schists and usually along the contact with the granites or in bands of rock crushed between parallel faults. The iron was originally deposited in marine sediments, and has been concentrated in consequence of the intrusion of the granites and diabases and of the faulting. The author, in concluding his discussion, quotes a passage from Van Hise attributing the origin of many ores to the materials of igneous rocks, and he inserts iron in the list given by Van Hise; but the case of iron is so different from the others that this addition is scarcely justified.

The existence of a tar spring associated with some hot springs near Lander, in Fremont County, Wyoming, was sufficient indication of petroleum to justify the search. A report by Mr. E. G. Woodruff describes the geology of the district and the evidence as to its supplies of oil. The neighbourhood consists of a series of rocks ranging from the Carboniferous to Eocene, and including a long series of the Mesozoic. There are two oil-bearing horizons, of which the most prolific is the Embar formation, belonging to the Carboniferous; there is a smaller supply in the Upper Cretaceous. The thirteen existing wells yield a supply of 330 barrels a day. The field is one of those in which the productive positions occur along an anticlinal axis.

The Salt Creek oilfield in Natrona County, also in

¹ "Mineral Resources of the Llano-Burnet Region, Texas, with an Account of the Pre-Cambrian Geology." By S. Paige. Bulletin 450, U.S. Geological Survey, Washington, 1911. Pp. 103+v plates+22 figs.

"The Lander and Salt Creek Oil Fields, Wyoming." The Lander Oil Field, Fremont County. By E. G. Woodruff. The Salt Creek Oil Field, Natrona County. By C. H. Wegemann. Bulletin 452, U.S. Geological Survey, Washington, 1911. Pp. 87+xii plates+1 fig.

"A Geologic Reconnaissance in South-eastern Seward Peninsula and the Norton Bay—Nulato Region, Alaska." By P. S. Smith and H. M. Eakin. Bulletin 449, U.S. Geological Survey, Washington, 1911. Pp. 146+xiii plates+15 figs.

"Geology and Mineral Resources of the Nizina District, Alaska." By F. H. Moffit and S. R. Capps. Bulletin 448, U.S. Geological Survey, Washington, 1911. Pp. 111+xii plates+11 figs.

"Contributions to Economic Geology." (Short Papers and Preliminary Reports, 1909.) Part II., Mineral Fuels. (M. R. Campbell, Geologist in Charge). Bulletin 431, Washington, 1911. Pp. 254+xii plates+4 figs.

Wyoming, is described by Mr. C. H. Wegemann. The country consists of Cretaceous rocks, lying between some Eocene beds and one which may be Jurassic. The oil-bearing horizons are the Upper Cretaceous Shannon "Sands," some 8 ft. of sandstone saturated with oil. The oil from a lower bed, the Wall Creek "Sand," rises in intermittent flows like a geyser, and Mr. Wegemann attributes the ascents to the same cause as geyser eruptions. A small quantity of oil also comes from a sandstone at the base of the Cretaceous series, which is regarded as possibly the equivalent of the Dakota Sandstone. This oil is associated with water, which in this case is fresh. Mr. Wegemann briefly discusses the origin of the oil; he regards it as derived from organic matter, and especially fossil fish in the adjacent shales, from which it passed into the sandstones. Mr. Wegemann regards this view as supported by the presence of sulphur in the oil.

The Seward Peninsula, the most western part of the mainland of America, projects into the Bering Sea between Norton Sound and Kotzebue Sound. A reconnaissance geological survey has been in progress for ten years, and has been completed by the work of Messrs. P. S. Smith and H. M. Eakin on two sheets, which include the country extending from the north of Norton Bay eastward to the Lower Yukon Valley. The country is geologically complex. It has a base of Archæan rocks covered by a varied series of Palæozoic sediments. In Middle Mesozoic times the region was occupied by land which was submerged in the Cretaceous, though the evidence as to the exact horizon of the marine Cretaceous beds is still indefinite. Great post-Cretaceous earth movements, accompanied by some igneous intrusions, folded and faulted all the lower rocks; as some of the dykes have been faulted, the movements continued later, but the post-Cretaceous faults had no direct influence on the topography. The country was subsequently dissected by river erosion. The country was never covered by an ice sheet, in spite of its high northern latitude and its proximity to the sea; but the authors discovered traces of small glaciers in some of the valleys. The country has shared in the post-Glacial oscillations which are so conspicuous along the Alaskan coasts. The economic minerals of this district include alluvial gold, silver, lead, and copper, and some Cretaceous coal.

The chief copper mines of Alaska are situated among the Wrangell Mountains at the head of the Copper River. Some of the most promising ore bodies occur in the valley of the Chitistone River, a little to the west of the Canadian frontier. The rocks of this district are all Mesozoic, and include the Upper Triassic Chitistone Limestone and Macarthy Shales. The age of the Kennicott formation is still somewhat doubtful; it has been often referred to the Lower Cretaceous, but in the view of the authors is probably Upper Jurassic. Unlike the Seward Peninsula, the country has a comparatively simple geological sequence, and has been strongly glaciated. It shared in the great Cretaceous uplift, which led to its dissection by stream erosion. The valleys were moulded by ice, which, according to the authors, not only gave them their trough-shaped form, but deepened them by from 1000 to 1500 ft., an estimate based on the height of the hanging valleys. The dissection of the country was aided by two series of faults which intersect at right angles and divide the country into blocks, some of which have been lifted and others lowered. The country was thus disturbed by displacements which, though small, had an important indirect effect. One exceptional geographical feature is described by Moffit and Capps as "rock glaciers." They consist

of streams of rock talus with the interstices filled by ice, so that the whole mass can move like a glacier. They therefore resemble the stone rivers of the Falkland Islands, in which the flow was due to interstitial mud.

Bulletin 431 contains a series of short papers and preliminary reports dealing with mineral fuels, including petroleum, natural gas in North Dakota, and the coals and lignites of Alabama and various western States.
J. W. G.

RECENT WORK ON INVERTEBRATES.

NO. 3 of vol. iv. of "Memoirs of the Department of Agriculture of India" is devoted to the life-history and habits of the big brown Indian cricket (*Brachytrypes achatinus*), the various stages of development being illustrated by a coloured plate. According to the author, Mr. C. C. Ghosh, these insects, which measure nearly two inches in length, and are burrowing and nocturnal in habit, have recently been the cause of considerable injury to various crops, such as jute, rice, and tea.

The parasites of the hymenopterous family Dryinidæ form the subject of Bulletin No. 11 of the Entomological Reports of the Experiment Station of the Hawaiian Sugar-planters' Association. After a review of the classification of the group, Dr. R. C. L. Perkins, the entomologist to the association, describes a number of new species from various parts of the tropics.

To the fourth part of vol. cxxi. of the *Sitzber. K. Akad. Wiss. (Math.-Naturwiss. Klasse)* several specialists contribute further accounts of the organisms collected during Dr. Werner's recent zoological expedition to the Egyptian Sudan and northern Uganda, Prof. F. Klapálek describing the Neuroptera, Dr. F. Ris the Libellulæ, the Rev. E. Wasmann the Termites, Dr. Werner the genus Embidaria, and Prof. O. Fuhrmann the cestodes of birds.

Students of distribution, as well as specialists in this particular group, will be interested in Mr. M. Connolly's list of the South African land and fresh-water molluscs in the South African Museum, published in vol. xi., part 3, of the Annals of that institution. The total number of species recorded is 596, of which no fewer than forty-one are included in the characteristically Ethiopian genus *Achatina*.

In part 4 of the same volume Messrs. Goddard and Malan commence a descriptive account of South African leeches (Hirudinea), so far as they are at present known. Although all the families of the group are represented in South Africa, land-leeches have not hitherto been detected, this being due, no doubt, to the unsuitability of the zoologically explored portions of the country to their existence.

The nets of trawlers returning to Hull from the North Sea and the neighbourhood of Iceland have yielded to the search of Mr. John Thompson a rich harvest of the hydroid zoophytes of those waters. These have been studied by Mr. James Ritchies, the results of whose investigations are published in vol. xviii., No. 4, of the Proceedings of the Royal Physical Society of Edinburgh. A considerable increase in our knowledge of certain species has been made, and one form is described as new.

In *The Entomologist's Monthly Magazine* for November Mr. Claude Morley discusses a certain mysterious sibilant humming in the air said to be not uncommonly heard during the summer in this country. That the sound is due to insects there can be no reasonable doubt, and Mr. Morley considers himself justified in attributing it to two species of Chironomids, *Chironomus dorsalis* and *Tanypterus varius*, both of

which normally fly at a high elevation. The ground for this identification is that during a bout of the humming gusts of wind arose which drove specimens of these insects within reach. That Chironomidæ are capable of producing sounds has been previously recorded in America.

To the *Sitzungsberichte der Kgl. Böhm. Ges. Wiss.* for 1911 Dr. E. Schera communicates the first two parts of a study of Turbellarians, mainly based on specimens collected in various parts of Bohemia. Such a critical study, it is claimed, was urgently needed, since many of the genera and species have been named on insufficient materials, and synonyms are consequently rife, and even now certain forms cannot, for the same cause, be properly described. In the first part of his memoir the author describes certain new genera and species, while in the second he monographs the group Olisthanellini.

To Records of the Indian Museum, vol. vii., part 4, Messrs. F. H. Gravely and S. P. Agharkar communicate notes on the habits of the Indian fresh-water jellyfish (*Limnocnida indica*), the discovery of which was recorded in NATURE, vol. lxxxvii., p. 144, 1911. The species occurs in western Indian in the Yenna and Koyna, tributaries of the Krishna, and it is believed also in the Krishna itself near Dhom. It has been observed in April and May, and is well known to the natives, by whom it is called *chakra-phul* (wheel-flower), deep pools forming its favourite haunts. From the lack of any evidence of the occurrence of special resting eggs, it is inferred that there must be a fixed hydroid generation.
R. L.

MIGRATIONS BETWEEN AUSTRALIA AND AMERICA.

A PAPER by Mr. Hans Hallier on former land-bridges, and plant and human migrations between Australia and America, appears in *Mededeelingen van's Rijks Herbarium*, Leyden, for 1912, No. 13. At the outset the author refers to earlier conclusions, based on botanical evidence, that Indonesia, Australia, and Polynesia at one time formed a great Australian peninsula, most of which subsequently sank, either wholly or in part, leaving the mountains of Tasmania, New Zealand, New Caledonia, the Louisiades, New Guinea, the Moluccas, Celebes, the Philippines, Formosa, &c., to serve as centres of plant-dispersal between China and Polynesia, these being separated by deep sea from the mountains of eastern Australia. In earlier times the peninsula was connected by land with America, the northern boundary of this bridge extending from southern Japan through the Sandwich and Revilla-Gigedo Islands to Lower California, while the southern limit seems to have passed by way of the Society and Paumotu Islands from Tasmania through the Auckland, Campbell, Antipodes, and Chatham groups, and thence through Easter Island, Sala-y-Gomez, and Juan Fernandez to the south of Chile. To summarise the evidence of community of origin of the flora of this area, and of the relationships of language-roots, is here impossible, but reference may be made to certain American designs, considered by Wiener to represent lamas, but, according to the author, intended for kangaroos. After stating that, from linguistic evidence, southern Asia should be regarded as the dispersal-centre for the life of Indonesia and Polynesia, and referring to the community of type between ancient Egyptian, American, and south Asiatic art, the author expresses the opinion that Egyptian and American culture travelled from a south Asiatic source by two routes, one to Africa, and the other by way of Indonesia and Polynesia to America.