by south, the Eastern Bay affords good shelter to vessels of all classes in from 4 to 12 fathoms, and upon pretty good holding ground."

The last edition of the "Admiralty Channel Pilot" says :—

"Off the pitch of the Ness, near the lighthouse, it is steep-to, there being 4 fathoms at 100 yards, and 15 fathoms at 330 yards from the beach. . . . The roads on either side of Dungeness afford excellent and extensive anchorage, according to the state of the wind, with good holding ground, consisting of fine sand over clay and mud."

The Chesil bank, to the West of Portland, in a deep embayment, away from the current of tide, is a remarkable example of the heaping-up power of the wind-waves from the south-west, as it is piled up at the leeward or eastern end, next Portland, 30 feet above high water, or treble the normal height above the sea of such formations.

The Harbour Commission of 1840 reported against Dungeness as a site for a refuge harbour of artificial formation, on account of the continued increase of the spit, as indicated by the necessity for altering the position of the lighthouse, which at its re-erection in 1792 was 100 yards from the sea, and at the period of a then recent survey was 218 yards distant, showing an increase of 118 yards in 47 years. The original lighthouse was, at the erection of its successor in 1792, 640 yards from the shore. The Harbours of Refuge Commission of 1844 also reported on it, referring to its excellent anchorage, and the danger of interfering with nature in such a spot. The changes in this remarkable formation have been so extraordinary, as fully to endorse these official conclusions, and the various vicissitudes it has undergone demand more careful consideration than is usually afforded by those who advocate artificial works, the effect of which on these nicely-balanced movements would possibly be as problematical as the turning of these shingle "fulls" into quarries for building purposes would be suicidal, and either course might result in a baneful interference with one of the finest natural breakwaters on our coasts.

J. B. REDMAN

Dispersal of Bivalves

REFERRING to the fact mentioned in Mr. Darwin's letter, that mussels are sometimes brought up on the point of a hook, it is common, in shell collections, to find "Heart Cockles" (*Isocardia cor*), which look exactly as if they had been drilled each with a small hole, centred at some point in the opposed edges of the two valves.

These specimens have been taken by the long-line fishermen on the Irish coast, and the apparent puncture is caused by the animal having closed upon the shank of an accidentally intrusive fish-hook with such force as to crush the edges of the shell against the steel wire.

Numbers of this comparatively rare species have been thus procured, for Isocardia will allow itself to be drawn in with the line rather than open its doors to new possibilities of danger while the hook is within.

D. PIDGEON

Holmwood, Putney Hill, April 12

The Yellow River and the Pei-ho

As bearing on the subject of my paper on the hydrology of the Chinese rivers, which was published in NATURE (vol. xxii. p. 486), I take it upon myself to forward the substance of some observations made by Mr. T. W. Kingsmill—president of the North-China branch of the Royal Asiatic Society—at a meeting of the Society in September, 1880.

Having made measurements of the cross-section of the Yellow River, and having obtained the most reliable information he could gather regarding the depth of water and the speed of the current at different seasons, Mr. Kingsmill roughly estimates the discharge as follows :—

Extreme low water	18,000	cubic feet per second.
Ordinary ,, ...	36,000	,, ,,
Flood discharge	112,000	,, ,,

The average discharge he is inclined to estimate at about three-fourths of the single estimation supplied in Sir George Staunton's narrative; and he places it at, or rather surmises that future careful observations will estimate it to be, 300,000,000 cubic feet per hour, or about 83,000 cubic feet per second.

With reference to the Pei ho, Mr. Kingsmill, from an observation made in the summer of 1879, estimated its water-discharge at 9000 cubic feet per second. My own estimate was confined to the winter months; but for reasons given in my paper I considered it fairly typical of the whole year, viz. 7700 cubic feet per second. That I was justified in so doing, this independent observation of Mr. Kingsmill sufficiently proves.

H.M.S. *Lark*, Auckland, February 28 H. B. GUPPY

Table of the Appearance of Rare Lepidoptera in this Country in Connection with the Sun-Spots

THE following table is a numerical abstract of the records relating to the capture of certain rare lepidopterous species in the United Kingdom, condensed from a larger table presenting an abstract of the pages of the *Magazine of Natural History*, *Zoologist*, *Entomological Magazine*, *Entomologist*, *The Entomologist's Weekly Intelligencer*, *Naturalist*, *The Entomologist's Annual*, *The Yorkshire Naturalist*, *Newman's British Butterflies*, and other works. It will show the relation existing between the sun-spot cycles and the appearance of the species, yet not quite so distinctly as my larger compilation, since, in order to adapt it to the pages of NATURE, it has been necessary to equalise the sun-spot cycles, which has caused, I fear, a certain overlapping of the cycles of capture, which really are well defined. I was not aware until quite recently that any one had been before me in this branch of entomology, but I now find my remarks in the *Journal of Science* for August, 1881, corroborated in a previous publication (Dr. F. G. Hahn, "Ueber die Beziehungen der Sonnenfleckenperiode zu meteorologischen Erscheinungen," pp. 155-157, Leipzig, 1877). This pamphlet is noticed (E. D. Archibald, NATURE, vol. xix. p. 145, article, "Locusts and Sun-Spots").

Years.	Sphinx Convolvuli.	Delephila Galii.	Deilephila Livornica.	Chærocampa Celerio.	Chærocampa Nerii.	Colias Edusa.	Colias Hyale.	Argynnis Lathonia.	Vanessa Antiopa.	Pieris Daplidice.		
1832, 43, 54, 65	1	1	4	25	2	309	62	16	13	—	433	
1833. 44 55, 66	1	2	1	1	2	382	71	3	1	—	464	*m*
1834. 45, 56, 67	23	14	11	16	6	117	18	10	5	1	221	
1835, 46, 57, 68	735	14	40	14	4	440	1109	136	79	12	2583	+
1836, 47, 58, 69	121	7	5	1	1	116	6	48	14	6	325	
1837, 48, 59, 70	162	233	30	3	2	95	13	10	3	9	560	
1838, 49, 60, 71	20	3	20	11	1	345	7	3	1	8	419	M
1839, 50, 61, 72	5	—	2	5	—	80	47	308	7	3	457	
1840, 51, 62, 73	9	3	8	—	2	5	5	20	—	—	52	
1841, 52, 63, 74	—	—	—	2	--	9	—	27	5	4	48	–
1842, 53, 64, 75	162	—	1	11	1	67	213	9	—	1	465	

The numbers give the amount of captures in the years specified; but in the case of *C. Edusa* and *C. Hyale* a 10 has been placed for every notice of "abundant," a 5 for every notice of common, the number of captures not being often stated.

Abbreviations employed + maximum appearance, – minimum of appearance, *m* minimum of sun-spots Wolf, M maximum of sun-spots Wolf.

A. H. SWINTON

Binfield House, Guildford, March 23

THE APPLICATION OF ELECTRICITY TO SHIPS' LOGS

THESE are days of rapid scientific progress, and the great interest so recently excited by the application of electricity, in a new and startling way, to transmit information, has been almost eclipsed by the attention which its use for lighting and the transmission of power has attracted. Though no longer confined to signalling, yet this is still its most important use, and one for which its employment is being extended in many directions, always with the most satisfactory results. It is with the application of electricity this fleet messenger for giving a constant record of the rate of a ship, that this article is concerned. Before, however, dealing with this matter, it will be well to say a few words about logs generally.

Ordinary ships' logs are of two kinds, called respectively harpoon and taffrail logs. Harpoon logs, which are the more extensively used, consist of a cylinder, on one end of which works a fan or screw, registering the number of revolutions by means of clockwork within the cylinder, the dial being visible through a glass face. To the other