said to have been pierced three times by a vertical shaft. Yet the coals are not anthracite. The Vobster pits are very fiery. The Radstock pits, where the coal is horizontal, not so; but they are worked in higher beds.

By reference to the Commissioner's report to Parliament, 1871, it will be seen (p. 38) in Mr. Prestwich's report on the Nettlebridge Valley coals, where Vobster is situated, that my recollections are confirmed; "bituminous coal" and "disturbed condition" being alike attributed to these coal beds.

With respect to the general question of the mechanical theory of earth-heat, I would respectfully refer Mr. Lesley to my examination of the theory in the *Philosophical Magazine* for October, 1875.

Harlton, Cambridge

O. FISHER

On the Origin of Certain Granitoid Rocks

In a paper by me "On the Pre-Cambrian Rocks of Shropshire," read before the Geological Society on the 11th inst., I call attention to certain granitoid and gneissic rocks in Primrose Hill, at the south-west end of the Wrekin. Associated with these metamorphic strata in such an irregular manner as to suggest an eruptive origin is a compact felspathic rock with minute quartz grains, which I at first presumed to be a quartz felsite. On submitting specimens to Prof. Bonney, F.R.S., for microscopic examination, he declared the rock to be clastic, and closely allied to the hlleflintas, which Dr. Hicks assigns to his Arvonian group. Certain observations recently made in south-west Shropshire, suggested to me a transition between the hlleflinta and the granitoid types, and, on communicating my suspicions to Prof. Bonney, he stated that a similar connection had been suggested by his microscopic examination. This morning I hammered over Primrose Hill foot by foot, and I have the satisfaction of announcing the fullest confirmation of our suspicions. In the same block, the compact hlleflinta is frequently mixed up with granitoidite and hornblende gneiss. In some cases, the metamorphism has taken place only near the surface, as if produced by atmospheric agencies; in others the crystallisation occurs in nests, while in others there is a gradual transition in mass from a compact to a granitic structure. This passage of hlleflinta into granite has obviously important theoretical applications.

Wellington, Salop, June 21

C. CALLAWAY

Migrations of Birds

I NOTICED some time ago a communication in NATURE respecting this subject, stating that it would be instructive and interesting alike if naturalists would record any data they may have collected on this subject. For years now this matter has had my careful attention, and I therefore forward a few notes for the last two seasons, and also put forward the hope that observers stationed in other parts of the United Kingdom will contribute information of a like nature. I would also say that the weather noted applies to the night—the time, by the way, generally chosen for migratory movements.

Vernal Migration, 1878

Dates.	Species.	Remarks.
April 4	Gray Wagtail	... In pairs on the trout streams for nesting season. Weather clear, warm westerly breezes.
" 4	Tree Pipit	... In full song and seen for first time; westerly breezes.
" 15	Redstart	... In full song in Encliffe Wood and Rivelin Valley; warm westerly breezes, clear.
" 15	Willow Warbler	... Numerous, arrived during last night.
" 15	Ring Ousel	... Numerous and full of song.
" 18	Chiffchaff	... In small numbers, westerly breezes, very warm, close.
" 19	Swallow	... One specimen seen; westerly breezes, fine and clear.
" 19	Cuckoo	... Heard and saw flying over the busiest streets of Sheffield at 4.30 A.M.
" 22	Whitethroat	... One heard; dull and misty drizzling rain, W.S.W.
" 22	Martin and Sand	Numerous, in company with swallows in the Derwent Valley.
" 28	Blackcap Warbler	... First seen, but silent; warm breezes, S.E.S.
" 29	Whinchat	... Seen for first time, weather dull, S.E.S.
" 29	Common Sandpiper	... Seen for first time, in pairs, in Rivelin Valley.
May 3	Landrail	... First heard, weather dull and gloomy, W.
" 6	Spotted Flycatcher	... First seen, very wet night, wind direct, S. These birds are still solitary.

Vernal Migration, 1879

Dates.	Species.	Remarks.
Feb. 10	Song Thrush	... Arrived in night; dark and cloudy, wind W.
" 10	Blackbird	... Arrived in night; dark and cloudy, wind W.
March 20	Yellow Wagtail	... Numerous.
" 20	Pied Wagtail	... "
" 29	Willow Warbler	... One specimen seen, somewhat feeble, silent; wind W. by S., night dull and showery, snow only left ground day before. Never known this species so early before. Average time being April 5.
" 29	Greenfinch	... Again in usual haunts after being entirely absent during the winter, with the exception of one pair seen in a garden in Sheffield.
April 9	Chiffchaff	... Saw and heard in young fir plantations at Hollow Meadows, S.W. and westerly winds.
" 21	Curlew	... In pairs at breeding grounds on moors.
" 21	Ring Ousel	... Numerous on moors, mostly in pairs; no song.
" 24	Tree Pipit	... Arrived; dull and showery weather, easterly winds.
" 26	Willow Warblers and Chiffchaffs	On the evening of 25th not a bird was seen; on morning of 26th the birds abounded and their cheery notes are heard on every side. The night was dark and showery (new moon), wind S.
" 26	Cuckoo	... Heard in Lees-hall Wood. This bird has arrived during past night, doubtless in same flight as willow warblers, &c.
" 28	Swallow	... Seen in Meersbrook Park; weather showery and dull, wind light from S.W., moonlight.
" 29	Whinchat	... Seen in Meersbrook Park; weather showery and dull, wind light from S.E., moonlight.
May 2	Wheatear	... On moors, full of song.
" 2	Common Sandpiper	... Rivelin and Redmires dams, in pairs. This species has been here some few days.
" 2	Redstart	... This bird has now arrived, but only seen in small numbers. Cold easterly winds, moonlight.
" 5	Wryneck	... Saw on Rivelin moors; solitary and uttering its whistling notes. Cold easterly winds.
" 8	Landrail and White-throat	... Heard in meadows; very scarce; probably came last night with a cold south-westerly breeze.
" 12	Sand Martin	... Skimming over the waters in small numbers. This species is remarkably late; wind N.W. by W.
" 13	Blackcap	... Singing in densest covers, and very shy. This species is very late. South-westerly breeze, clear night.
" 17	Martin	... Saw a pair of these birds; they are very late as compared with previous seasons. Southerly breezes and very showery.
" 24	Swift	... One seen on the borders of the Rivelin Moors. South-westerly breezes and very showery.
" 26	Spotted Flycatcher	... One specimen seen, silent and somewhat wary. N.W. by W., light, and showery moonlight night.

Such are a few extracts, taken *verbatim*, from my note-book; they might have been considerably increased, and the time of departure noted, as well as the arrival of our winter migrants, but I fear I have already trespassed too greatly on your valuable space. I sincerely trust that this interesting subject will be more fully discussed and studied by your correspondents and readers; for in that way many of the difficulties enshrouding the movements of the feathered tribes will be overcome.

Heeley, near Sheffield, June 9

CHARLES DIXON

Glow-worms v. Snails

YOUR correspondent, Mr. R. S. Newall, has unconsciously reversed the natural condition of affairs in his note (NATURE, vol. xx. p. 197). The heading should have been as above. Glow-worms devour snails, which are their natural food. The particular snail in question had probably been attacked by one of the glow-worms, which had left some of its phosphorescent matter adhering to it, and this occasioned the idea that it was showing through the body of the mollusk. Possibly in this case the snail may have proved too large for the glow-worm. An allied insect, *Drilus flavescens*, somewhat rare in this country, and not luminous, is, so far as the female is concerned, seldom

found excepting inside the shells of species of *Helix*, the animal of which it had previously devoured. R. MCLACHLAN
Lewisham, June 27

YOUR correspondent, R. S. Newall, is upon the wrong tack, I think. His glow-worm was probably eating the snail, and not *vice versa*.

In Kirby and Spence's "Entomology" I read: "Snails give sustenance to *Drilus flavescens*, a beetle, and its singular apterous female in the larva state, as well as to the larvæ of glow-worms." Is it not probable that the same food suits the imago state of the insect?

I have often found glow-worms in snail shells, and have always considered slugs and snails to be the natural food of the *Lampyris noctiluca*. R. GREENWOOD PENNY

Bishopsteignton, Devon

Frogs and Glow-flies

MR. NEWALL may be, perhaps, interested with the following extract from Darwin's "Botanic Garden," Canto iv. p. 149, note:—

"In Jamaica, in some seasons of the year, the fire-flies are seen in the evenings in great abundance. When they settle on the ground, the bull-frog greedily devours them; which seems to have given origin to a curious, though cruel method of destroying these animals; if red-hot pieces of charcoal be thrown towards them in the dusk of the evening, they leap at them, and, hastily swallowing them, are burnt to death."

I was told a few days ago of a cat which used to search for and eat glow-worms. It was suggested that she took them for lights. GEORGE HENSLOW

Intellect in Brutes

THE following instance of sagacity in a cat has just been related to me by a friend who knew both the cat and its owner well. The latter, who lived at Ragusa Vecchia, in Dalmatia, was too poor to be able to provide food for the cat; the animal was therefore obliged to cater for himself, and was well known as a thief in the neighbourhood. One day one of the children was being sent off to school without any breakfast; the cat, hearing him sobbing for hunger, immediately went off, and returned with a piece of bread he had stolen from a baker hard by, and brought it to the child. The same thing happened another day, and he came back, dragging along a piece of meat bigger than himself. On crossing the threshold a bit of bone caught in a hole, so puss miawed till some one came to his help. This same cat, who was constantly catching birds on the roof, slept with some pet birds in a cage without attempting to touch them.

Ragusa, Austria, June 18

MARGARET EVANS

I SEND you the following instance of intelligence in dogs:—Last summer, when on a visit at the château of my son-in-law, M. Richard Waddington, Député, near Rouen, I had taken a walk in the grounds, accompanied by some of the family, and two favourite dogs, named respectively Minos and Rhadamanthus, followed the party, as usual, throughout the stroll. When nearing the house, on the return, my young grand-daughter remarked that Minos had lost his collar. The party came to a halt, debating whether it was worth while to go back on a searching expedition, for the pleasure grounds are somewhat extensive, and the dogs had been rambling away from the paths among long grass. Both Minos and Rhadamanthus evidently seemed to listen to the debate. It was decided to make the search at a venture, and, without saying a word to the dogs, the party commenced to retrace their steps. As a rule, these two dogs are inseparable; wherever the one goes, the other goes, and invariably the two follow any members of the family when strolling about the place. At this juncture, however, Rhadamanthus, not having lost a collar, and having no special interest in the proposed search, went on her solitary way home to the stables; but Minos kept with the party, walking on the gravel path—and this for some distance—when suddenly he took to the meadow, commenced running, and presently he was observed to stop and remain fixed with his head pointed downwards, partly buried in the tall grass. Naturally he was followed. The point of his nose was in contact with the collar! Could any child of man, under similar circumstances, have displayed more thoughtful sagacity than did each of the above dogs on the above occasion? The

one thought she was not wanted, and having had enough play, wisely went home, whilst the other, thinking that his presence was requisite, wisely returned with the searching party.

When in Bute, some years ago, I heard from a gentleman, perfectly trustworthy, that a large Newfoundland dog, belonging to a friend of his, was observed one night by its owner lying concealed under his bed—a strange circumstance, because the dog was forbidden to enter the house at night. The owner, being struck by this singular occurrence, resolved not to disturb the creature, and, getting into bed, kept himself awake to watch events. It was not long before a sound was heard in the passage, a faint light was seen through the key-hole, the door opened, and instantly the dog flew from under the bed, and, springing forward, brought a man to the ground, the gentleman's own servant, who, accompanied by another fellow, was there for the purpose of robbery. CHAS. POPHAM MILES

Vicarage, Monkwearmouth

HAVING read Mr. Peach's letter on "Intellect in Brutes," as shown by the sagacity he witnessed in his dog, I have been asked to send a similar anecdote, which I have often told to friends. Many years ago my husband had his portrait taken by T. Phillips, sen., R.A., and subsequently went to India, leaving the portrait in London to be finished and framed. When it was sent home about two years after it was taken, it was placed on the floor against the sofa, preparatory to being hung on the wall. We had then a very handsome large black and tan setter, which was a great pet in the house. As soon as the dog came into the room he recognised his master, though he had not seen him for two years, and went up to the picture and licked the face. When this anecdote was told to Phillips, he said it was the highest compliment that had ever been paid to him. X.

SOME years ago a fine arts exhibition was held at Derby. A portrait of a Derby artist, Wright, was thus signalled: "The artist's pet dog distinguished this, from a lot of pictures upon the floor of the studio, by licking the face of the portrait."

Derby

HENRY CLARK

Butterfly Swarms

WITH reference to the swarms of butterflies referred to by M. Forel, in NATURE, vol. xx. p. 197, it may be interesting to mention that *Vanessa cardui* is this year very common in the south of England. This butterfly is known to all English lepidopterists to be "periodical"—in some seasons it occurs in great numbers, in others—perhaps for several years in succession—not one specimen is to be seen.

Last season (1878) I saw no specimens, nor did I hear of any about here. It seems, therefore—in such a bad season for insects as the present—impossible to consider the abundance of the species in England to be the result of "local fecundity." Whence, therefore, come these specimens? and is the periodical abundance of the species in Britain due to local causes or migration? J. H. A. JENNER

4, East Street, Lewes, July 1

THE KILBURN SHOW

IT is difficult to estimate the disadvantages with which the Agricultural Exhibition at Kilburn has had to contend. So large a show must always be somewhat unwieldy, however skilfully planned, but the melancholy wet season has enormously increased the difficulties of arrangement, and we may add that rarely to study the implements and miscellaneous exhibits was quite impossible up to the time of our going to press. A few jottings set down at random concerning such instruments, operations, and specimens as drew our attention while in the yard on Monday must suffice on the present occasion. Visitors were supposed to view the exhibits from the avenues between the long rows of sheds; but these avenues, once grass, were transformed into roads of mud, in every condition of matter between the solid and liquid states. There were no paths across the sheds, and as most of the implements and other exhibits were not so arranged as to be approachable on more than one side, the difficulty of examining objects of interest was frequently insurmountable.