particularly deplorable personal reference at p. 417 which might well have been spared.

The fundamental difficulty in the author's psychological theory is his ambiguous treatment of the self. He speaks of it, now as a product and process of development, in terms which seem to identify it with the moral character, again as a mysterious something behind character and acting causally upon it. The discussions of particular virtues in part ii., if somewhat too diffuse, are, to my mind, the most suggestive things in the whole book. In part iii. the attack on "utilitarianism" is too bitter to be discriminating. Egoistic Hedonism may be an illogical theory, but an egoistic Hedonist need not in practice be a worse man than his neighbours; it is mere vituperation to assert that "few prostitutes are so vile" as to be egoistic Hedonists.

The religious problems raised and in part treated by Prof. Ladd are too grave to be dealt with in a summary note like the present. A. E. T.

The Thompson Yates Laboratories Report. Edited by Rubert Boyce and C. S. Sherrington. Vol. iv., part i., 1901, and vol. iv., part ii., 1902. Pp. 563. (London: Longmans and Co.)

THE first ninety pages of part i. of this Report are occupied by a description of the filariæ or blood-worms obtained by the Liverpool Expedition to Nigeria. This practically constitutes a monograph upon this important group of parasites, is from the pen of Messrs. Annett, Dutton and Elliott, and a number of new species are described and illustrated. Dealing with human filariæ, the opinion is expressed that, notwithstanding certain differences between them, the weight of evidence is on the side of the identity of *Filaria nocturna* and *F. diurna*. The bibliography accompanying this paper should prove of the greatest value to future workers in the subject. The other important papers in part i. are the "Flora of the Conjunctiva in Health and Disease," by Dr. Griffith, and the use of bile-salt broth as a test for fæcal contamination, by Drs. MacConkey and Hill. The former gives a very complete account of the bacteriology of the conjunctival sac, and, like Lawson, Griffith has found the Xerosis bacillus to be a common inhabitant of the normal sac. In MacConkey and Hill's bile-salt broth we have a very useful medium for the detection of the *Bacillus coli* and allied species in water, but the procedure recommended, viz. to add 1 c.c. of the water to each of three tubes, would detect, in all probability, only a highly polluted water, not one in which the *B. coli* was present in small amount, in which case it is essential to concentrate the water by filtration through a porcelain filter and to examine the deposit. The same remarks apply to the examination of samples of the Liverpool water supply; the quantity of water examined (1 c.c.) is far too little to give a trustworthy negative result.

In part ii., Mr. Macdonald contributes an exhaustive paper upon the "Injury Current of Nerve," and Dr. Grünbaum and Prof. Sherrington make an important contribution to the physiology of the cerebral cortex in the higher apes. Dr. Annett produces some startling figures relative to the frequency of expectoration in public thoroughfares and the risk of infection with tuberculosis therefrom. The volume contains several other papers of minor importance upon various points of bacteriological, pathological and clinical interest, and concludes with the Report of the Liverpool Expedition to Brazil to study yellow fever, by Dr. Durham and the late Dr. Myers. The latter is somewhat disappointing, the ætiology of yellow fever being left very much where it was, save that a fine bacillus, difficult to stain and impossible to cultivate, was detected in the tissues.

In conclusion, it may be said that these volumes maintain in every respect the standard of their predecessors. R. T. H.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Sunset Effects.

AT Baveno (Lago Maggiore) on the evening of July 10, when the sun was setting behind the mountains in the north western quarter of the horizon, a number of bright streaks of light appeared to radiate from behind a bank of clouds in exactly the opposite quarter of the sky. As these streaks were very bright near the point from which they apparently emanated and gradually faded away with increasing distance from that point, the effect was to produce the impression that the sun had set in the south-east instead of in the north-west. The explanation of the phenomenon is perfectly simple, being that the beams of sunlight, cut off by clouds and mountains, had travelled overhead through a clear atmosphere and, reaching the hazy air over the plains of Lombardy, had illuminated this air, which was especially thick at a point opposite the sun, the streaks appearing to converge to a vanishing point by the laws of perspective. The effect no doubt occurs whenever the necessary conditions prevail, viz., banks of clouds or mountains in the direction of the setting sun, a clear sky overhead and a thick atmosphere in the quarter opposite the sun.

G. H. BRYAN.

THE letter on iridescent sunset effects in the current number of NATURE (p. 370), and the correspondence now going on in the columns of *Science*, prompt me to send the following extract from my journal which was made on board the barquentine *Dayspring* while lying at anchor in Friday Island Passage, Torres Straits, on November 29, 1897:—

"The sun was setting behind cumulostratus clouds, while a little to the southward the horizon was occupied by a large storm cloud through which lightning was constantly playing, and other clouds of various types were scattered over the sky. Behind the storm cloud and between it and the sun were several very fine even textured cirrostratus patches; these assumed *prismatic* coloration. The colours were very vivid and included the blues and greens as well as those of the red end of the spectrum; and they appeared to be arranged in the sequence of Newton's rings. The appearance of the clouds reminded me of a polarisation phenomenon. The colours were disposed in broad concentric bands shading into one another; they appeared to be dependent upon the *thickness* of the cloud mass, and were most brilliant at its thinner parts. The colours changed but slightly as the sun sank behind the horizon, but after a time the prismatic effect gave place to the ordinary sunset glow."

The phenomenon thus described made a great impression upon me at the time, and I am quite convinced that it had nothing in common with the normal "glow" reflected by the setting sun. S. PACE.

Hounslow, August 18.

THE OLDER CIVILISATION OF GREECE: FURTHER DISCOVERIES IN CRETE.[1]

IN a review of No. VI. of "The Annual of the British School at Athens," published last year (vol. lxiv. p. 11), the great importance of the discoveries of Mr. A. J. Evans at Knossos in Crete was pointed out, and the opinion was expressed that that volume contained "matter of extraordinary interest to students of the history, not only of Greece, of Egypt, and Western Asia, but also of mankind in general," for, since "the culture which now dominates the world is the child of the civilisation of Ancient Greece, . . . any archæological discovery which tends to increase our knowledge of the beginnings of Greek civilisation possesses an importance and an

1 "The Annual of the British School at Athens." Part vii. Session 1900-1901. Pp. vii + 191. (London: Macmillan and Co., Ltd.)

interest far greater than that of any other possible discovery whatever in the archæological field." The writer then proceeded to sketch briefly the position of Mycenæan civilisation in history, insisting more especially upon what is now a commonplace of archæological knowledge—the fact that "the culture of classical Greece, as we know it, is but the second epoch of Greek civilisation. Classical Greece had a past, the true history of which had been half forgotten, had been preserved in confused and contradictory legends. The culture of the past had bloomed from end to end of the Greek world, in cities, some, like Athens or Knôssos, of renown in classical as well as præ-classical days, others, like Mycenæ and Tiryns, cities whose fame ceased to be when the Dorians entered Greece. This culture was bronze-using, and was, in fact, the Greek phase of the European culture of the Bronze Age, a phase earlier in date than the phases of Central and Northern Europe, and in all probability not only their forerunner, but to a great extent their forebear."

In Mycenæan discovery progress is swift, and the ideas of one year are never precisely those of the year before; and since these lines were penned the appearance of Prof. Ridgeway's "Early Age of Greece" has caused many defenders of the usual view to look well to their armour. For many weighty reasons which cannot be discussed here, it does not, however, seem probable that the view that the Mycenæan culture was not only the forerunner, but the forebear of the European culture of the Bronze Age, will be hastily abandoned in favour of the interesting theory propounded by Prof. Ridgeway. The discoveries of the last two years have pushed back the existence of human civilisation of the highest and most developed type in the Ægean basin to so remote a date B.C. that the possibility of this culture having derived its origin from Central Europe is fast fading away; it is to Egypt, if anywhere, that we must look for the first impulses of Ægean culture, and it is to this Ægean culture that we must look for the origins of the European civilisation of the Bronze Age. So that while it may be an exaggeration to say that the relation of the prehistoric civilisation of Greece to this general European culture is quite clear, it is none the less a mere affectation of reserve to imply that the nature of this relation is not, generally speaking, pretty clearly indicated by what evidence we have. The evidence points to the Ægean culture having been the forebear of the general European civilisation of the Bronze Age, of which it itself may be regarded as the Greek phase.

No dogma can be proclaimed as to the ethnic affinities of the people to whom this Ægean culture belonged. In "The Oldest Civilization of Greece," pp. 105, 202, the present writer has essayed the opinion that "the Mycenæan culture had well begun before the arrival of the Aryan Hellenes"; and we may, in fact, well hold that its originators belonged to that "Mediterranean Race" of Sergi, which extended from Armenia to Spain. When, however, the fair-haired invaders from the north —the "Celts" of Prof. Ridgeway—descended upon the Ægean world, it would seem that they took over the civilisation of their predecessors, over whom they henceforth ruled and with whom they mingled, while giving them their Aryan language. So it is that "the whole of Greek culture from the solid rock of the Athenian acropolis up" is indeed one, for the civilisation of the Aryanised "Hellene" was directly descended from that of the un-Aryan "Pelasgian" of Knossos or Phaistos without any "very violent break." Thus it is possible, without inconsistency, to write also that "the Mycenæan culture belonged primarily . . . to Hellenes," when one is not using the word "primarily" in the sense of time at all, and when, too, one has expressly, in order to make one's meaning clear even to the most careless critic, inserted between the words "primarily" and "to Hellenes" the sentence (in brackets) "*not entirely or necessarily originally*" ("Oldest Civilization of Greece," p. 104; not in italics in original). The sentence, "the Mycenæan culture belonged primarily (but not entirely or necessarily originally) to Hellenes" cannot be made to disagree with that previously quoted to the effect that "the Mycenæan culture had well begun before the arrival of the Aryan Hellenes," without suppressing the words within brackets, and thus suggesting a meaning for "primarily" not intended by the author.

The present writer holds, therefore, to his opinion, as expressed in "The Oldest Civilization of Greece," that the Ægean culture belonged originally to the præ-Hellenic race or races, but that in all probability some of its most important developments took place among populations already "Hellenised," *e.g.* in Argolis; *i.e.* it "belonged primarily to Hellenes." How far Cretan discovery may modify this position it is impossible as yet to say; in all probability, however, the modification will be in the direction of considerably reducing the probable connection of the Aryanised "Hellenes" (Achaians) with, at any rate, the Cretan monuments of the "Ægean" or early Mycenæan age, and in bringing the præ-Aryan, præ Achaian population into greater prominence. Such a development has long been foretold by Prof. Ridgeway; but it is not probable that his drastic proposition "No 'Mycenæans' were Achaians" will ever be accepted in its entirety. To him, however, the inception of the idea is due; the point on which one would be inclined to criticise him is his proposition that the Pelasgians were Aryans, which, since the work of Kretschmer and Sergi has appeared, seems an old-fashioned view. Following Kretschmer, the present writer has maintained the view that the primitive population of the Ægean basin was of "kleinasiatisch" race, and that this race was not Aryan, since Lycian, the typical "kleinasiatisch" language, and its cognate idioms, Carian, &c., are obviously not Aryan, *pace* Prof. Bugge and one or two other Scandinavian philologists who still maintain the opposite view. In *Sphinx*, vol. ii. p. 120, the well-known veteran archæologist, Prof. Piehl, of Upsala, still holds the Scandinavian view, saying:

"Nous savons, grâce à Bugge, à Thomsen et à Torp, que cette langue [Lycian], très-vraisemblablement, est d'origine aryenne bien authentique."

With all respect to Prof. Piehl, it, however, must be recorded that, except in Scandinavia, Kretschmer's view seems to be now generally accepted, more especially since his philological results agree so remarkably well with those obtained by Sergi from craniological study.

We shall return to the question of race later; the above preliminary remarks are necessitated by the progress which has been made in Mycenæan study during the past year.

In the present number of the "Annual of the British School at Athens" Mr. Evans proceeds to describe the results of his further excavations at Knossos in 1901, when he was assisted by Dr. Duncan Mackenzie as excavator, and by Mr. D. T. Fyfe as architect. Mr. Fyfe has prepared the very clear and intelligible ground-plan of the palace which accompanies the memoir, and his services have no doubt been, generally speaking, of the greatest use to Mr. Evans, since nobody who has not visited Knossos can have much idea of the great amount of regular architectural, not to say engineering, work which has had to be carried out during the course of the excavations, consisting not only in the housing-over of the Throne Room (illustrated in NATURE, lxiv. p. 14, Fig. 4), but in excavating, shoring-up and underpinning staircases, remains of upper stories, &c., especially in the vicinity of the Hall of the Colonnades (Plan, G 10). Mr. Hogarth, who in 1900 excavated the town-ruins, did not work at Knossos in 1901, but transferred himself to the eastern end of Crete, where he worked on the

Mycenæan site at Zakro; his results are described in the present number of the "Annual."

The operations carried on at Knossos in 1901 are summarised by Mr. Evans on pp. 1, 2. Space forbids us to do more than select for description and discussion some of the more important results of his excavations.

The underlying Neolithic settlement was further investigated, and a report of the results obtained was made by Mr. Evans to the Anthropological Section of the British Association (Glasgow meeting, September, 1901; see NATURE, lxiv. p. 615).

The "Kaselles" (*κασέλλαις*), stone cists or receptacles beneath the floors of the Magazines (see NATURE, lxiv. p. 13, Fig. 2), have been proved to be chiefly safes for the keeping of treasure ("Annual," pp. 44 *ff.*).

The housing-over of the Throne Room has already been referred to. This work was urgently needed to protect the throne, &c., from the weather.

"In order to support the roof it was necessary to place some kind of pillars in the position formerly occupied by the Mycenæan columns, the burnt remains of which were found fixed in the sockets of the stone bench opposite the throne."

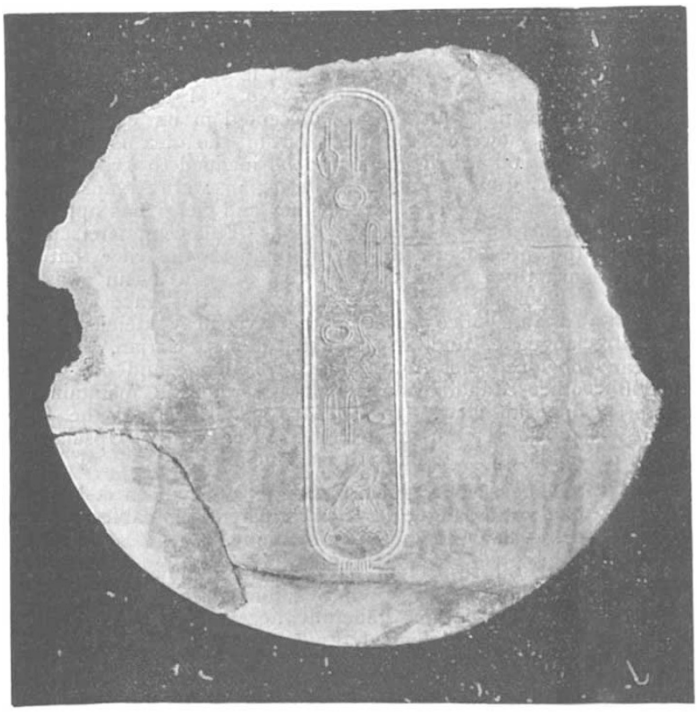

FIG. 1.—Egyptian alabastron-lid, inscribed with the name of the Hyksôs King Khyan (*c.* B.C. 1800). Found at Knossos.

Accordingly pillars of Mycenæan design were erected, and the whole roofed over. This necessary work of conservation is analogous to that at Dêr el-Báheri; no attempt at "restoration," as it is understood on the Continent, has been made. All who have seen the result can testify that it is entirely successful.

One of the chief results of the excavation is the inkling it gives of the great extent of the palace, which seems, in fact, to have not only covered the whole of the knoll on which it stands, but to have descended in a series of several-storied halls and towers down the eastern side of the hill to the bank of the stream which runs below. And now that Mr. Evans has announced the discovery at Knossos this year of contemporary representations of Mycenæan houses we may perhaps be able soon to acquire some idea of what the palace may have looked like when seen from the opposite eastern downs or from the way leading up from the sea. Mr. Fyfe's restored longitudinal section and plan (Fig. 33) give a very good idea of how the palace descended the eastern slope. On the left is seen one of the most sensational of Knossian discoveries, the quadruple staircase which descended from the Central Court to the Hall of the Colonnades, a hall which reminds one more of a court with *loggie* in an Italian palace than anything else! At the point of the staircase the palace was certainly three and probably four stories high; in fact, three flights of steps still remain. Originally the staircase "consisted of fifty-two stone steps, of which thirty-eight, and the indications of five more, are preserved." The excavation of the lowest flight "was of extraordinary difficulty, owing to the constant danger of bringing down the stairway above. It was altogether miner's work, necessitating a constant succession of wooden arches" (p. 104).

Down the greater part of this staircase it is now possible to walk, and in doing so the visitor gets a very good idea of the difficulties, already alluded to, which have beset Mr. Evans's work at Knossos, and of the successful way in which he has overcome them. But this heavy kind of work needs money, if it is to be properly carried out: the reader of NATURE who has a guinea or two to spare for archæological purposes could hardly do better than devote them to the Cretan Exploration Fund.

Mr. Evans is of opinion that "the whole result of the most recent excavations has been more and more to bring out the fact that, vast as is the area it embraces, the Palace of Knossos was originally devised on a single comprehensive plan. The ground scheme of a square building, with a central court approached at right angles by four main avenues, dividing the surrounding buildings into four quarters, is a simple conception which, as we now know, long before the days of the later Roman *Castra*, was carried out in the *Terremare* of Northern Italy. . . . The Minoan architect may claim the credit of adapting the same root idea to an organic whole, and fitting it in to a complicated arrangement of halls, chambers, galleries, and magazines, forming parts of a single building" (p. 100).

Further confirmation of the generally accepted date for the earlier parts of the palace, *c.* 1700 B.C. and later, was found in 1901 by the discovery in the "early Palace stratum," a deposit "containing a large proportion of charcoal, and representing the burnt remains of an earlier structure," and situated "immediately under the Mycenæan wall-foundations, at a depth of 40 centimetres below the later floor-level," of "the lid of an Egyptian alabastron, upon the upper face of which was finely engraved a cartouche containing the name and divine titles of the Hyksôs King Khyan" (see Fig. 1), who reigned somewhere about 1800 to 1700 B.C. The style of the hieroglyphs and phraseology of the inscription show us that this object is contemporary with the king whose name it bears. Therefore the discovery of this object of *c.* 1800–1700 B.C. may be taken to confirm the weaker evidence of the thirteenth dynasty statuette of Ábnub, son of Sebek-user (date *c.* 2000 B.C.), which was discovered in the course of the excavations of 1900, and with this to indicate roughly the date of the beginnings of the great Palace of Knossos, which is undoubtedly, as its excavator maintains, the veritable Labyrinth of Minos.

The store of Knossian inscribed tablets has been largely increased during the course of the excavations; it is much to be regretted that the Cretan Assembly seems unable to see its way to allow any of these tablets to leave Crete for the purpose of study and possible interpretation.

Our knowledge of Mycenæan life has been increased in a rather startling way by the discovery of a fresco-painting depicting, side by side with the well-known "cowboys" of the common Mycenæan scenes of ταυροκαθάψια, of *female* toreadors in the act of tackling infuriated bulls. Mr. Evans remarks (p. 95):—

"The episode is sensational in the highest degree, but we have here nothing of the mere catching of bulls, wild or otherwise, as seen on the Vaphio Cups. The graceful forms and elegant attire of these female performers would be quite out of place in rock-set glens or woodland glades. They belong to the arena, and afford the clearest evidence that the lords of Mycenæan Knossos glutted their eyes with shows in which maidens as well as youths were trained to grapple with what was then regarded as the king of animals. The sports of the amphitheatre, which have never lost their hold on the Mediterranean world, may thus, in Crete at least, be traced back to prehistoric times. It may well be that, long before the days when enslaved barbarians were 'butchered to make a Roman holiday,' captives, perhaps of gentle blood, shared the same fate within sight of the 'House of Minos,' and that the legends of Athenian prisoners devoured by the Minotaur preserve a real tradition of these cruel sports."

The sinister impression which is given by this discovery is not dispelled by the sight of the deep walled pits, described by Mr. Evans on pp. 35, 36, which are, no doubt, as he says, the dungeons of the palace.

"In these deep pits with their slippery cemented sides above, the captives would be as secure as those 'beneath the leads' of Venice. The groans of these Minoan dungeons may well have found an echo in the tale of Theseus."

One is irresistibly reminded of Watts's picture in the Tate Gallery of the horrible Minotaur leaning over the high battlements of Knossos, looking out to sea, awaiting the bringing of his prey. The civilisation of Knossos was probably by no means Arcadian, even if it was Pelasgic!

The artistic triumphs of this Minoan civilisation are further established by the discoveries of 1901: *e.g.* the splendid vase illustrated on p. 91 (Fig. 30), the high reliefs in painted *gesso duro* (Figs. 6, 29, pp. 17, 89) which are so characteristic of Knossian art, the carved stone weight (Fig. 12, p. 42), &c.; an interesting hint of costume is given us in Fig. 17, a fresco-painting, presumably of a girl, whose coiffure is exactly parallel to that of the men from *Keftiu*, who are depicted in the Eighteenth Dynasty tomb of Rekhmarā at Thebes in Egypt; while the wonderful gaming-board of gold, ivory, crystal, and *kyanos* (Fig. 25, p. 79) tells us something of the minor amusements of the princes of Knossos. A curious find, "which strongly suggests a more seamy side of the high civilisation here represented," is that of "a clay matrix formed by making a stamp from the impression of an actual seal, and which could thus be itself used as a signet for making counterfeit impressions of the same kind. The original of this was evidently a large gold signet-ring of a kind resembling, both in its form and the character of its subject, that found in the Akropolis Treasure of Mycenæ. That this, like the other, was a royal signet is highly probable, and what adds to the interest of the matrix is that several clay impressions taken from the original ring were subsequently found in association with a very important deposit of inscribed clay tablets. . . . It would seem that the [counterfeit] clay matrix was actually used for forging the royal signature" (p. 19).

A rather startling discovery was that of a quantity of small bone objects, perhaps for inlay, many of which are inscribed with signs, among which occur most of the letters of the later Greek alphabet, though "the Mycenæan date of these bone pieces is as well ascertained as anything found within the walls of the palace" (p. 119). Here is an enigma.

It is a strange thing, this Cretan civilisation of perhaps the eighteenth to the fourteenth centuries B.C. Mycenæ we know, but this is not Mycenæ, though it is "Mycenæan." Knossos is older, and Knossos is more civilised. Knossos is no hill fort, ἐν μυχῷ, Ἄργεος, like Mycenæ or Midea; Tiryns is more like it. But Tiryns itself is strongly fortified with galleries and casements, which even now are wonderful; Knossos, however, seems open to the attack of any enemy. It seems a palace of secure peace, apparently undefended by walls, a palace of luxurious baths and polished dancing-floors, inhabited by princes who seem to have taken their pleasure in the leading of a life of luxurious ease, surrounded by a court of ladies in most amazingly modern low-necked dresses and coiffures like the triumphs of a Regent Street window, and men with hair as long as the women's and almost as elaborately dressed, served by crowds of slaves and tribute bearers, and diverted by the witnessing of brutal sports of the arena, in which women figured as well as men, sports connected possibly with the worship of a cruel deity to whom human sacrifice was not unknown, for whom, perhaps, were incarcerated the victims in the oubliettes, like the holes of the trap-door spider, which exist within the palace walls. Knossos was the seat of the just and mighty Minos: it was also the Labyrinth of the Minotaur.

This is conjecture, but it conveys the impression which Knossos, and also Phaistos and Gournia, give: an impression of an ancient culture, highly developed, peaceful, art-loving and luxurious, effeminate if you will; but brutal withal and possessing sinister traits which oppress the mind.

What overthrew it? What overwhelmed the City of Live-at-Ease with a storm of long-forgotten war, and burnt its halls and towers with fire? The conquering Aryan from the north, probably; but we do not know. Who the Minoans themselves were we hardly know. Dark Pelasgians, of Sergi's "Stirpe Mediterranea," speaking a language akin to that of the Lycians, most probably; identical with the *Keftiu* of the Egyptian tombs, there is no doubt. To one who has not made himself fully acquainted with the details of the subject the thought may occur that these *Keftiu* and the famous Youth with the Vase, or Cupbearer, from Knossos perhaps belonged to some intermediate race (in Northern Palestine, perhaps), which sent tribute on the one side to the dynasts of Knossos, on the other to Pharaoh of Egypt. Such an opinion is easily refuted, as follows:—The Cupbearer is Mycenæan in costume: so are all the other male figures at Knossos; Mycenæans like the men of the Vaphio Cups. And since Knossos was a "Mycenæan" town inhabited by Mycenæans, the probability is that the representations of Mycenæans upon its walls are representations of Cretan Mycenæans. And since it is not "alleged," but is a *fact* well known to all who have eyes to see, that the eighteenth dynasty representations of the *Keftiu* at Thebes are practically identical, even down to minute details of costume, with the Knossian Cupbearer, the natural conclusion is that these *Keftiu* were Cretan Mycenæans. The date thus indicated for the coming of Cretan ambassadors to Egypt is *c.* 1550 B.C. That they may have come from Knossos or Phaistos is by no means impossible.[1]

The excavations of Mr. Hogarth in a Mycenæan town

[1] In "The Oldest Civilization of Greece" the present writer has expressed the view that these *Keftiu* were more probably Cyprian than Cretan Mycenæans. The progress of discovery in Crete has, however, now convinced him that they were more probably Cretans.

at Zakro, on the eastern coast of Crete, identified by Spratt with the site of Itanos, described by him in pp. 121–149 of the "Annual," are of great importance, not only as giving us much new knowledge of Mycenæan house-building, but as throwing light upon the question of Mycenæan connections with Libya. The use of bricks for the upper courses of house-walls is now proved. The bricks were large and flat, the largest measuring 24 × 16 × 4 inches, and "well and squarely laid" (p. 130). In the houses, besides vases, bronze implements, &c., was found a large number (nearly 860) of clay sealings, bearing impressions of intaglios, three of which are figured by Mr. Hogarth (Fig. 45; see Fig. 2 below). These "Minotaur" types are in the highest degree curious. This female figure with a bull's head; this bull-headed woman with a bird's wings and tail—are they mere fanciful designs, or do they point to the veneration of some strange androgynous deity?

However late in the Mycenæan age the existing remains of the settlement may be placed, "*these were still anterior to the Age of Iron*," says Mr. Hogarth (italics in original). . . . "Nor were any fragments observed of distinctly geometric vases. . . . The fact that the remains . . . come to a clean and abrupt finish with" the close of the Bronze Age, "showing no admixture of remains of the succeeding epoch, is in favour of those who hold that the use of iron and the

FIG. 2.—Clay Seal. Impression from Zakro.

inception of the geometric style resulted from some violent and radical social change in the Egean, such as conquest by a distinct race" (p. 146). Whether this was an Achaian or a Dorian conquest, Prof. Ridgeway and his critics must settle: personally, we still prefer the second alternative.

The settlement is regarded by Mr. Hogarth as a trading outpost of Knossos, and in view of the objects of Knossian type discovered, this view seems a very probable one.

"Its position," he says (p. 147), "indicates that Zakro traded with Libya direct, and not (as has been supposed) by a circuitous route through Rhodes and Cyprus." While still holding to his view that the circuitous route, by which we know came the great armament which attacked Egypt in Rameses III.'s time, in which it is possible that Cretan Axians were included,[1] was the most likely one for primitive navigators to follow, the present writer is inclined to think that he has, in "The Oldest Civilization of Greece," to some extent underestimated the possibility of direct communication in Mycenæan times between Crete and Libya. The bay of Zakro, remarks Mr. Hogarth (p. 123), "is the best known *rendezvous* and port of call for the fishing fleets of the eastern islands, which sail annually to the sponge-grounds off the Libyan shore. . . . For sailing craft the bay of Zakro is still the principal station on the road from the Ægean to Libya."

[1] It is true that Axos was an inland town but this was no bar to its having taken part in an over-sea expedition: see also Herodotos, iv. 154, which should not be forgotten.

The argument is a fair one, but we have no certainty that Mycenæan sailors were as familiar with the direct route to Africa as the modern sponge-fishers. The geographical objection to the theory of direct connection, which has been stated to be non-existent, is simply the absence of any coast leading the primitive voyager from Crete to Libya; he would naturally follow the coast round, as the later Greeks went from Greece to Sicily, and not sail south into an open and unknown sea. However this may be, space forbids the further discussion of the point here.

Mr. Hogarth appends a description by Dr. Boyd-Dawkins of proto-Mycenæan dolichocephalic skulls found by him, which the distinguished craniologist pronounces to possess characters which "point unmistakably to the fact that the possessors of the skulls . . . led the artificial life of highly civilised peoples" (p. 151). These skulls are regarded by him as belonging to the long-headed Pelasgic or Mediterranean stock of Sergi, which is what we should have expected.

The review of last year's "Annual" spoke of it as "the most important contribution to our knowledge of the early history of mankind that has appeared for many years" (NATURE, lxiv. p. 15). It can only be said of this year's number that in interest and importance it suffers very little by comparison with No. VI. H. H.

ALEXANDER KOWALEVSKY.

THE illustrious Russian embryologist and student of the anatomy of lower animal forms, Kowalevsky, died, to the great grief of the whole zoological world, on November 22, 1901, of an attack of apoplexy.

Kowalevsky was one of those rare men whose name is associated by all his contemporaries with a new departure in the branch of science which he cultivated. Albert Kölliker, still alive and well, had as long ago as 1844 followed with his microscope and drawn the division of the single cell constituting the egg of the cuttlefish, and had traced the process of the formation of the mass of embryo-cells by division of the cells resulting from the cleavage of the first or primary egg-cell. Remak, in 1850–58, had traced the evolution of definite tissues from the embryonic cells, and later students of the embryo chick had followed out the earlier indications of von Baer and were busy with the discussion of the origin and outcome of the embryonic layers of cells. But Kowalevsky went further than this, and in small transparent embryos (such as those of Ascidia, Amphioxus, Sagitta and Argiope) traced the history of adult organs cell by cell to the original egg-cell. It is this procedure which must immortalise Kowalevsky. Ten years after his first papers were published, the aim which he had given to embryological science became the definite and recognised purpose of successive generations of embryologists in England, Germany and the United States. Before Kowalevsky's work on the development of Amphioxus, carried out in 1864–65, and on Ascidia in 1866, zoologists were content to regard the cell-masses resulting from the first cell-divisions of the animal egg-cell as intricate heaps of units which no one could expect to analyse. Some way was made in the direction of their comprehension by the application to invertebrate embryos of the doctrine of cell-layers, but it was not until the avowed purpose of the embryologist became the definite tracing of the genesis of the cells of cell-layers one by one from pre-existing cells and finally from the first cell-divisions of the egg-cell that Kowalevsky's work bore its full fruit, and a thorough-going cellular embryology was established. Much still remains to be done on this basis, but we see it clearly foreshadowed in Kowalevsky's great memoirs on the development of Amphioxus and of Ascidia, wherein the identity of the nervous system, the