hatched embryo with its mouth closed, the egg-breaker was seen to form a sharp downwardly directed prominence, projecting freely, and in such a position as to leave little room for doubt that it is the direct agent in rupturing both membrane and shell. It may be added that in the three living specimens in my possession all traces of the egg-breaker have vanished—*i.e.* in that last hatched within seven days. G. B. HOWES.

Royal College of Science, London, January 31.

Attraction in a Spherical Hollow.

THE theorem of attraction stated by Prof. T. Alexander in NATURE of January 19, is a particular case of a more general theorem which I have not seen stated, though very likely it is not new. The well-known theorem of *couches de glissement* is also a case of it. Imagine two spheres, one of radius r and made of positive or attracting matter of density σ, the other of radius r' and made of negative or repelling matter of the same density σ, to coexist even if they overlap. In the space common to the two spheres the one kind of matter neutralises the other, so that the space may be considered as empty. The force on a unit particle of positive matter, placed at any point on the circle of intersection of the two surfaces, is parallel to the line of the centres A, B, of the two spheres and of amount $\frac{4}{3}\pi\sigma\kappa c$ where σ is the common density of the spheres, c the distance between their centres, and κ is the usual attraction constant. For the positive sphere attracts the particle towards the centre with a force $\frac{4}{3}\pi\sigma\kappa r$, and the other sphere repels the particle from its centre with a force $\frac{4}{3}\pi\sigma\kappa r'$. These forces give the resultant $\frac{4}{3}\pi\sigma\kappa c$ parallel to the line joining the centres of the spheres and from the repelling centre towards the other.

This resultant force is independent of the radii of the spheres, provided their centres remain at the same distance apart. It follows that the force at all points within the space common to the two spheres is parallel to the line joining the centres, and has the value just stated. For take any such point P and describe through it spherical surfaces about the centres A, B. The portions of the two spherical distributions which lie outside these surfaces exert no force at P. The spheres internal to P give the force $\frac{4}{3}\pi\sigma\kappa c$.

If one of the spheres is wholly within the other, we have the theorem of the force within a spherical hollow. It is only necessary in that case to suppose the hollow formed by the superposition of negative matter on the previously existing positive matter, and the result follows at once.

I may point out that a theorem similar to and including that stated above holds for two overlapping similar ellipsoids, of equal and opposite densities, and having their corresponding principal axes in the same directions, and one pair of these, say the axis of x of each, in the same line. The centres A, B lie on this line, and any point common to the two ellipsoids will have coordinates x, y, z, say, when referred to axes through A, and x', y, z when referred to parallel axes through B.

Taking, then, as axes of coordinates the principal axes of each ellipsoid, and considering any point in the overlapping portion, and describing through P about A, B as centres two ellipsoidal surfaces S, S′, each similar to the given ellipsoids, we obtain for the components of force on a unit particle due to the positive (say) matter of uniform density σ filling S, the values A_1x, A_2y, A_3z; and for the components of force at the same point due to the negative matter filling S′ the values

$$-A_1x', \quad -A_2y, \quad -A_3z$$

where A_1, A_2, A_3 are certain integrals which are here constants. The portions of the two ellipsoids external to P exert no force at P. Hence the resultant force on the particle at P is $A_1(x - x')$, that is, it is parallel to the line joining the centres, and proportional to the distance between the centres, and acts from the centre of the repelling towards that of the attracting ellipsoid.

If the coordinates of B, relatively to the axes through A, be a, b, c, so that there is not a pair of corresponding axes in line, the components of force in the overlapping space are A_1a, A_2b, A_3c. The force at every point is $\sqrt{A_1^2a^2 + A_2^2b^2 + A_3^2c^2}$, and is therefore fixed in magnitude and direction.

With reference to the magnetic experiments, it may be recalled that if within a uniformly magnetised ellipsoid there exist a similar ellipsoidal hollow, with its axes parallel to those of the magnetised ellipsoid, the magnetic force within the hollow is zero at every point. A similar result holds, of course, for a sphere. ANDREW GRAY.

Larvæ in Antelope Horns.

I HAVE read with interest the communications of your correspondents on "Larvæ in Antelope Horns" in NATURE of September 15, and also another note on the same subject in *The Entomologist* of July last; but NATURE of June 9, for some reason or other, has not reached me.

As for many years past I have been travelling and residing in Central Africa, have shot large and small game, and have made large collections of the heads of buffalos and antelopes, I have thought that it may be worth while to record my own observations in this matter.

Is it the fact, proved beyond all doubt, that the larvæ in question are those of Lepidoptera and not of Coleoptera?

My own experience is that, unless preventive measures (such as I am about to describe) have been taken in the first instance, the horns of my specimens become infested with the larvæ of what I have hitherto believed to be two small species of *Coleoptera*—the one and smaller of bright metallic-green throughout, the other and larger of dull coal-black above, and white on the underside—which larvæ eat their way up and through the horns, throw out cocoons, and continue doing so until the horns are destroyed, leaving nothing but the cores.

If the heads have been neglected, and left in the open—say either on the ground, or in a tree—the larvæ very soon develop and commence their depredations, all the sooner if the heads have been left with the skin and flesh on.

If, however, these last be removed within a few hours after the animal has been killed, and the bases of the horns and their cores be carefully lathered over with strong arsenical soap where the skin has been cut away from round the horns, and between these and their cores as far up as the hairs of the brush will reach, the larvæ do *not* develop; and heads thus treated, if properly housed, henceforth enjoy absolute immunity from them.

I have a collection of antelopes' heads treated in this way now at Machako's, and though of all ages up to ten months old, there is not a perforation or a cocoon in any one of them; whereas, on the same station, I have noticed that the horns collected by other officers, and not properly cared for, become, most of them, after a time, simply perforated and woolly with cocoons.

Should the larvæ have established themselves, they can readily be killed by pouring paraffin into the horns, and leaving these on end for a day or two so as to retain the oil.

Never once have I remarked these larvæ in the horns of a freshly-killed animal.

I have, however, occasionally found the larvæ of *Diptera* in the flesh of some antelopes—notably so lately in Masailand in the case of a fine male Grant's gazelle, whose body, otherwise in first-rate condition, after being skinned, presented the spectacle of being "flicked" white with larvæ about the size and shape of barleycorns, at intervals of two inches or so.

A propos of the destructive little Coleoptera once more:—

On landing in England from Africa in the spring of 1884, I was at Euston, and amongst my battered and travel-stained baggage on the platform was a large truck-load of buffalos' and antelopes' heads. As I was standing talking to one of my brothers who had come to meet me, an old gentleman, who had been narrowly inspecting the load of heads, suddenly stooped down, and concentrated his gaze on one particular spot: then, fumbling in the pocket of his tail-coat, he produced a pill-box, and dexterously boxed something from one of the buffalo heads. It proved to be one of the green beetles!

Then turning, and realising that I must probably be the owner of the heads, he politely raised his hat and apologised for what he had done, adding that he had taken a species of Coleoptera which—I think he said—was new to him.

I lost no time in assuring him that no apology was necessary, that the obligation lay on my side, not on his!

Mr. Lionel Crawshay, my brother (whose address is Brasenose College, Oxford), can, I think, show you specimens of the green beetle, and possibly of the other as well: if not, I shall be very pleased to send you a series of both; as also, if you wish them, specimens of horns perforated by the larvæ and with their cocoons attached. RICHARD CRAWSHAY.

Simba Camp, British East Africa, November 29, 1898.

P.S.—As an afterthought, I am enclosing you 2 specimens of the green beetle 2 specimens of the black beetle, and 2 larvæ, which I hope will survive the post. R. C.