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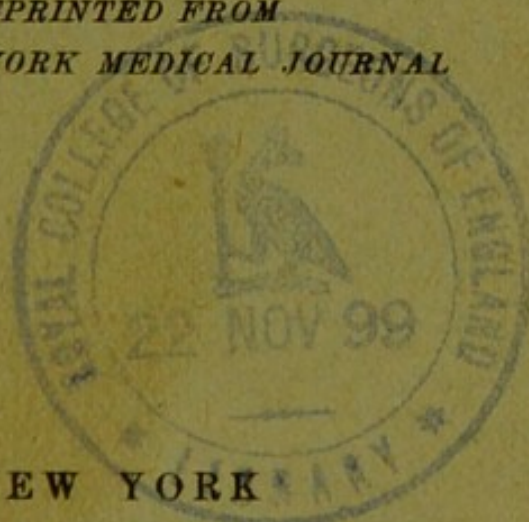
A NEW METHOD IN BRAIN STUDY

*FISSURA CALCARINA
CEREBRAL EIDOLA—PROTHYMIA
INTENTION—THE ANTHEMION*

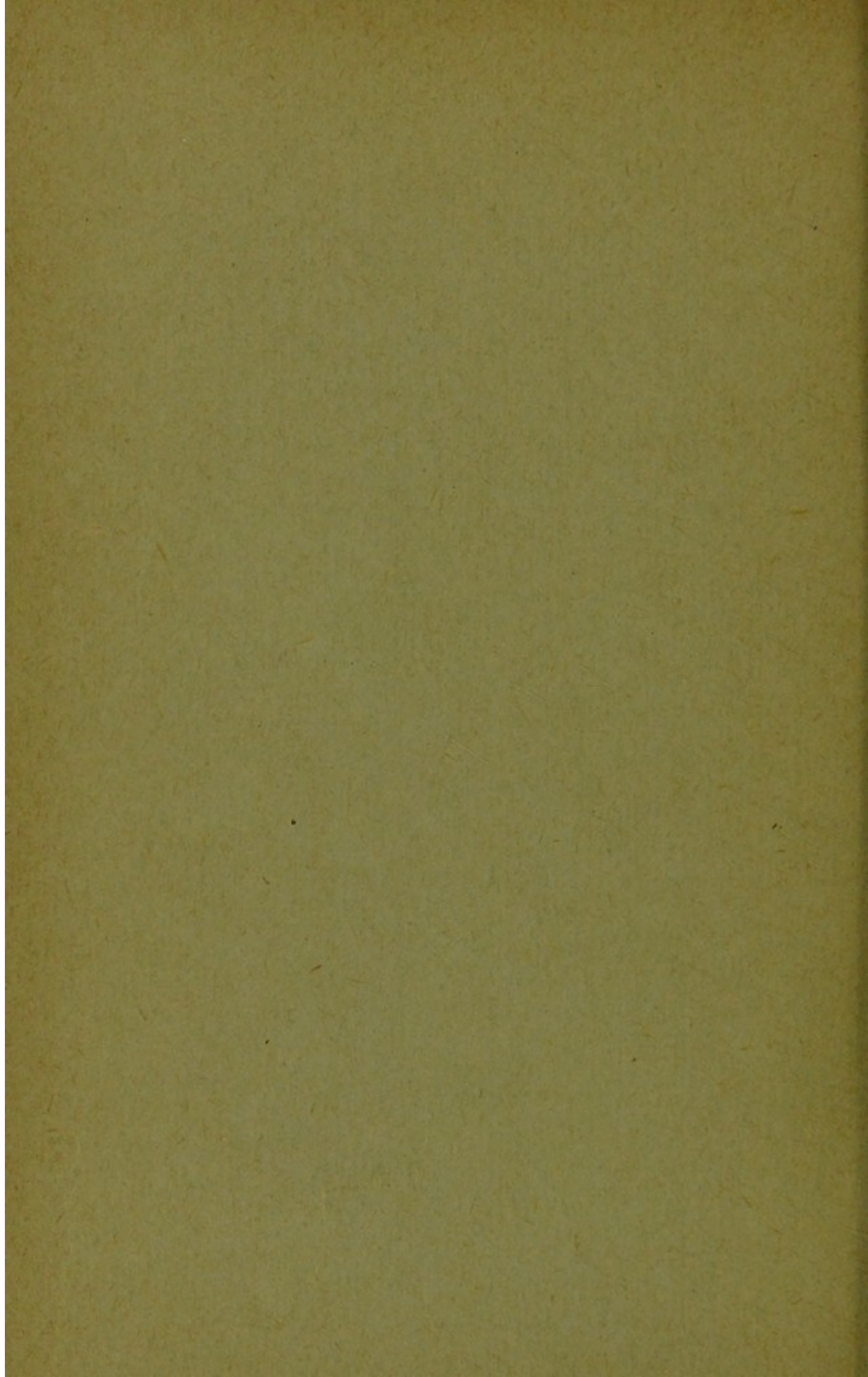
BY
WALLACE WOOD, M. D.

N.Y. University

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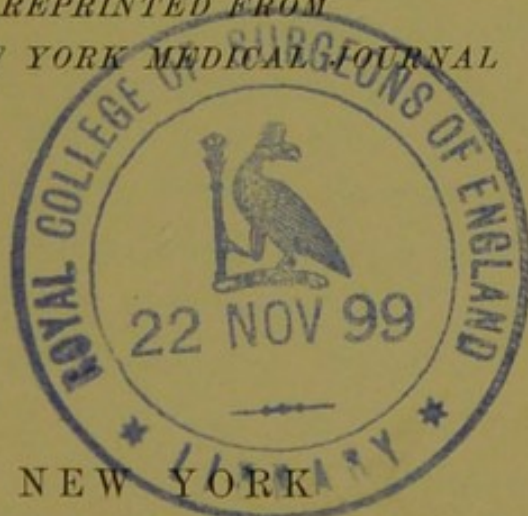


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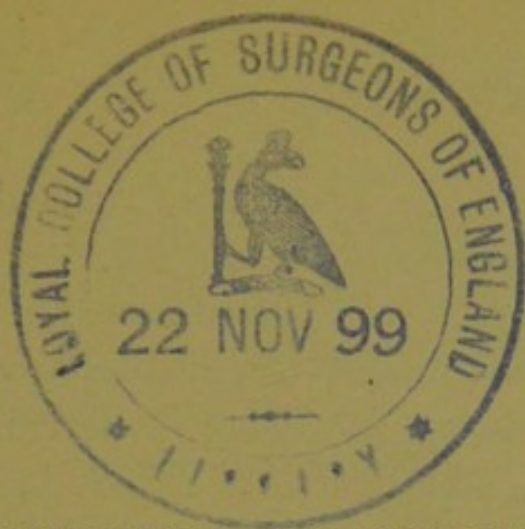


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A NEW METHOD IN BRAIN STUDY.

COMPARATIVE anatomy and the dry process offer to us a new field of observation. Broca followed this method with good results. Since his time it has fallen into neglect. If the cerebrum of an ox (*Bos taurus*) be prepared with medicated glycerin and that of a human being (*Homo sapiens*) with dilute nitric acid, the result will be two brain mummies, two pieces of brain sculpture of about equal size. Viewing the two specimens side by side with this unmistakable advantage of equality in size, one is led to observe the gyri with greater care and to trace out with the eye and with a brush and paint perhaps what appear to be homologies.

That such homologies are found need not indeed be a cause of surprise. Hath not an ox eyes and ears? Hath he not a nose and tongue and a manus and pes? Why, then, should he not have an eye gyrus, an ear gyrus, a paracentral lobule, and a Rolandic vortex? That these lines of psychical action will be found upon the bovine brain and every gyrus and lobule identified it appears to me one may reasonably presuppose. Long ago it was laid down by Gratiolet that the cerebrum of ungulata bears a closer resemblance to that of man than does that of the carnivora. May not one go a step further and divide brains into two classes, the murderous and the non-murderous? Those of *Felis* and *Canis*

would belong to the first group, and those of ovines, bovines, and primates to the second.

During the past year I have prepared by the dry process, without shrinkage, the hemispheres of forty-two bovines, thirty being American cattle from the abattoirs in New York, and twelve of Norfolk, Guernsey, and Irish stock from the cattle market, Islington, London. The collection includes calves, steers, heifers, cows, fatted oxen, bulls, old working oxen, and "stags." The subject is not without interest. Little by little I have

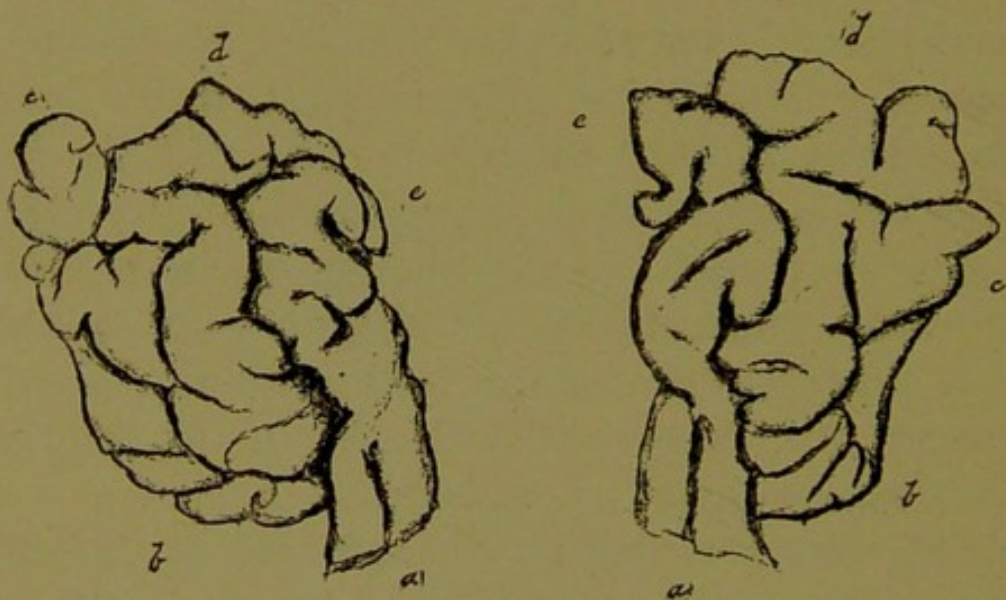


FIG. 1.—Right and left under occipital lobe of Norfolk bull from the cattle market, Islington, London. *a*, the hippocampus cut off; *b*, *c*, *d*, the three parts of the fusiformis, which is highly developed; *e*, the ligula, also at a maximum.

found it possible to go a certain way in distinguishing age, sex, and class by the hypertrophy and atrophy of frontal and occipital gyri. The contrast between the brain of a Norfolk cow and that of an Irish bull, for instance, is quite as striking as the contrast in the external appearance of their heads.

One of the most interesting regions of the cerebrum, and yet one least studied, is the under-occipital. This

portion, which in *Homo* appears as a hollow, a wide arch, or concavity, in the bovine creature exhibits quite the reverse formation, a convexity or dome, which in the mature male assumes proportions that can hardly be described as less than prodigious.

Notwithstanding the difference between *taurus* and *Homo*, the gyri of this under-occipital lobe are certainly

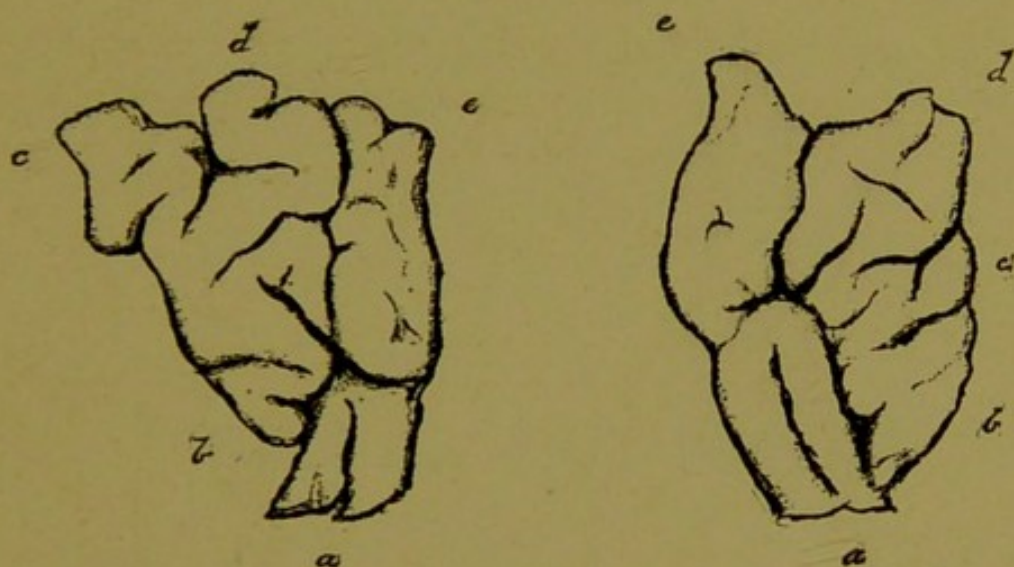


FIG. 2.—Right and left under occipital lobe of a fat ox, NORFOLK breed, from Islington. *a*, the hippocampus cut off; *b*, *c*, *d*, the three sides of the fusiformis, reduced or shrunken; *e*, the ligula, atrophied or reduced to its simplicity. The brain of this animal was quite as large as that of Fig. 1.

homologues, and are those known in man as the *ligula*, or gyrus temporo-occipitalis medialis, and the fusiformis, or gyrus temporo-occipitalis lateralis.

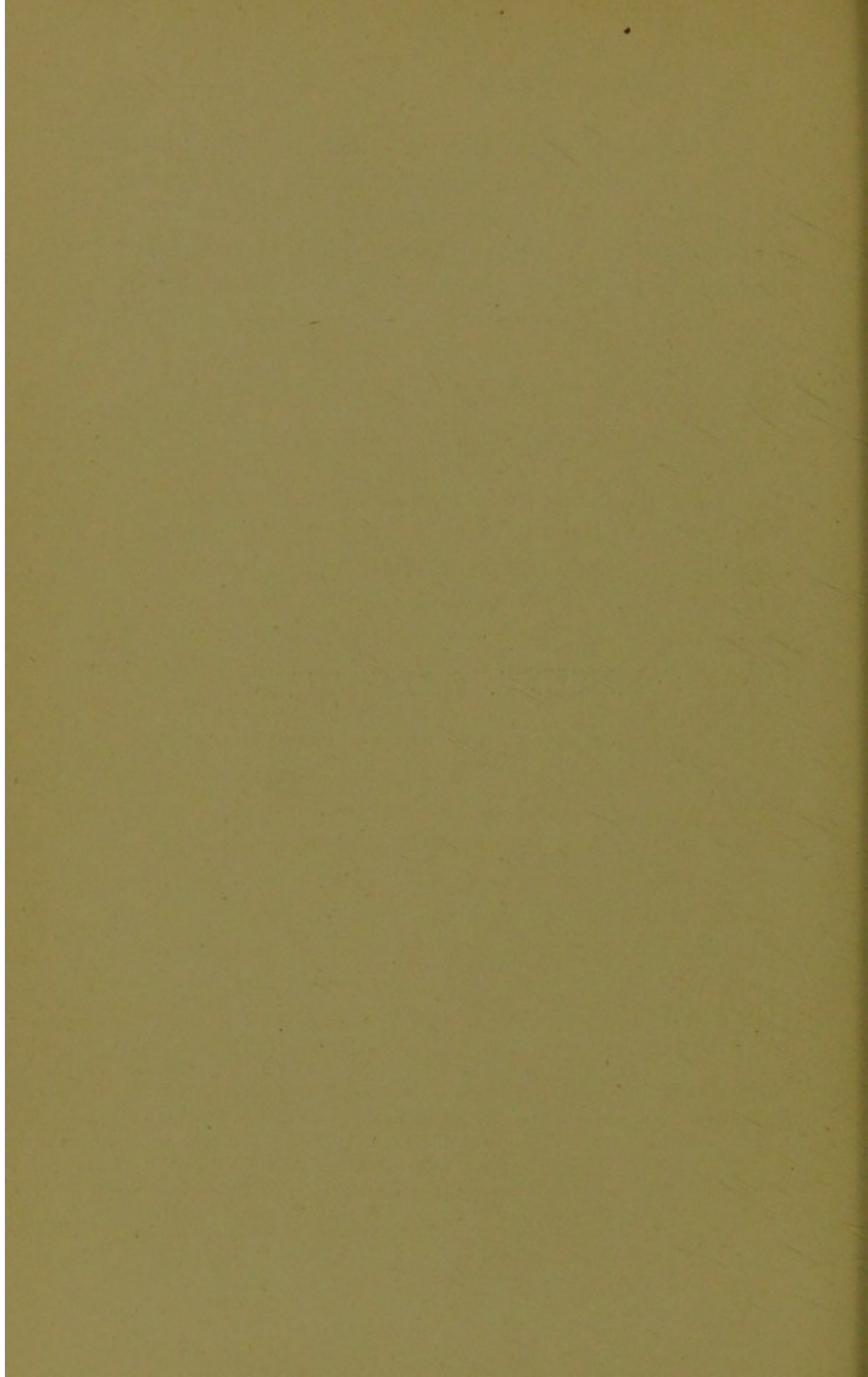
The under-occipital lobe consisting of these two lobules exhibits in cattle certain marked differences according to age, sex, and breed. It attains its maximum development in the mature bull and is seen at its minimum in the fatted ox.

In good dairy cows of Holstein and other breeds it often presents an appearance suggestive of flowers or fruit. In old working oxen the gyri become, as it were,

proliferous and look like wide-branching horns. Thus one comes to recognize certain fixed types.

Here, now, is the vital point. The ligula and the fusiformis in *Homo* and *Bos taurus* are unmistakable homologues. The question arises, Do not homologous forms imply analogous functions?

FISSURA CALCARINA



FISSURA CALCARINA HYPERTROPHY AND ATROPHY.

TWO CONTRASTING CASES.

WHEN first asked where he sees his father's ghost, the sombre Dane replies, "In my mind's eye, Horatio." Had Hamlet been a medical student of to-day he might have replied, "In my calcarine fissure, Horatio," or still more explicitly, "In the calcarine fissure between the cuneus and ligulate lobule of the mesial surface of my occiput, Horatio." This strange locality, in truth, is the only spot upon earth where ghosts are ever seen, for it is the centre of mental vision, the cerebral eye itself. The calcarine fissure is the cortical retina. Such, at least, is the demonstration of Henschen, accepted by Ferrier, Mills, and others.

I have in my possession at the present time two pairs of brains which, by their unusual and interesting contrast of maximum and minimum, seem to present a fine illustration of the newly discovered truth. The first is that of a Parisian man of letters, an individual who may be said to have seen too much, since he died from general paralysis brought on by "too constant reading of books"; while the other case is that of a French woman who never saw at all, having been born blind. "Aberrant cases yield crucial tests." Here we

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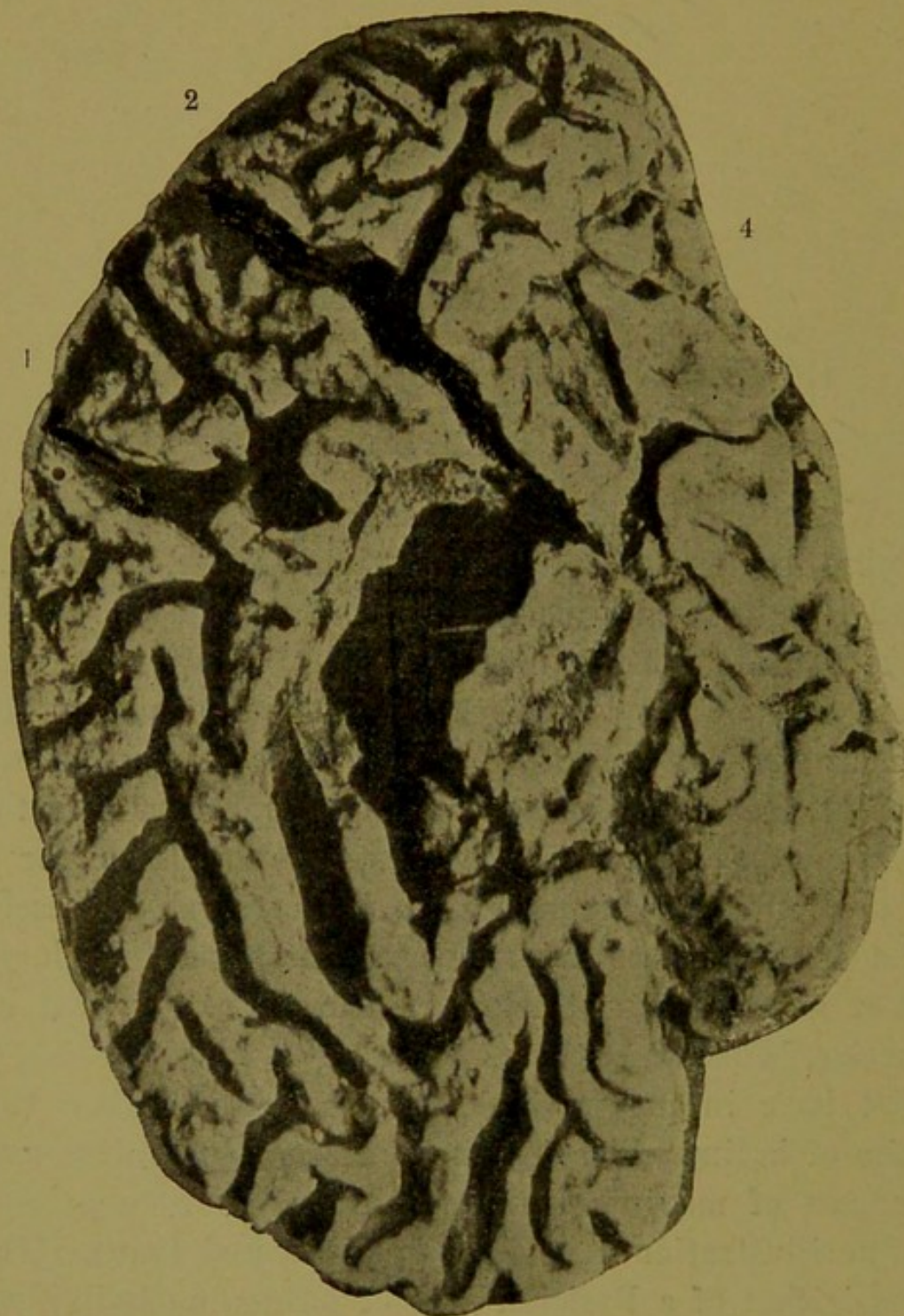


FIG. 1.—Right brain of M. Pequoit, a Parisian man of letters : inside surface showing hypertrophy of the over occipital lobe (cuneus and calcarine fissure) and atrophy or dwarfing of the under occipital lobe (ligula and fusiformis). 1, the quadrate lobule ; 2, the cuneus expanded to a quadrate ; 3, the calcarine fissure expanded to a star and bordered by a ribbon ; 4, the lower occipital lobe cramped and dwarfed or shortened. The calcarine fissure dominates, tyrannizes, and occupies almost the entire space.



FIG. 2.—Right brain of Madame Rodin, a blind woman : inside surface showing diminution of the cuneus, and closing of the calcarine fissure with high and perfect development of the under occipital lobe. 1, the quadrate lobule, unusually broad ; 2, the cuneus, small and but slightly marked ; 3, the fissura calcarina closed up ; 4, the lower occipital lobe, well expanded and extended in both lobules.

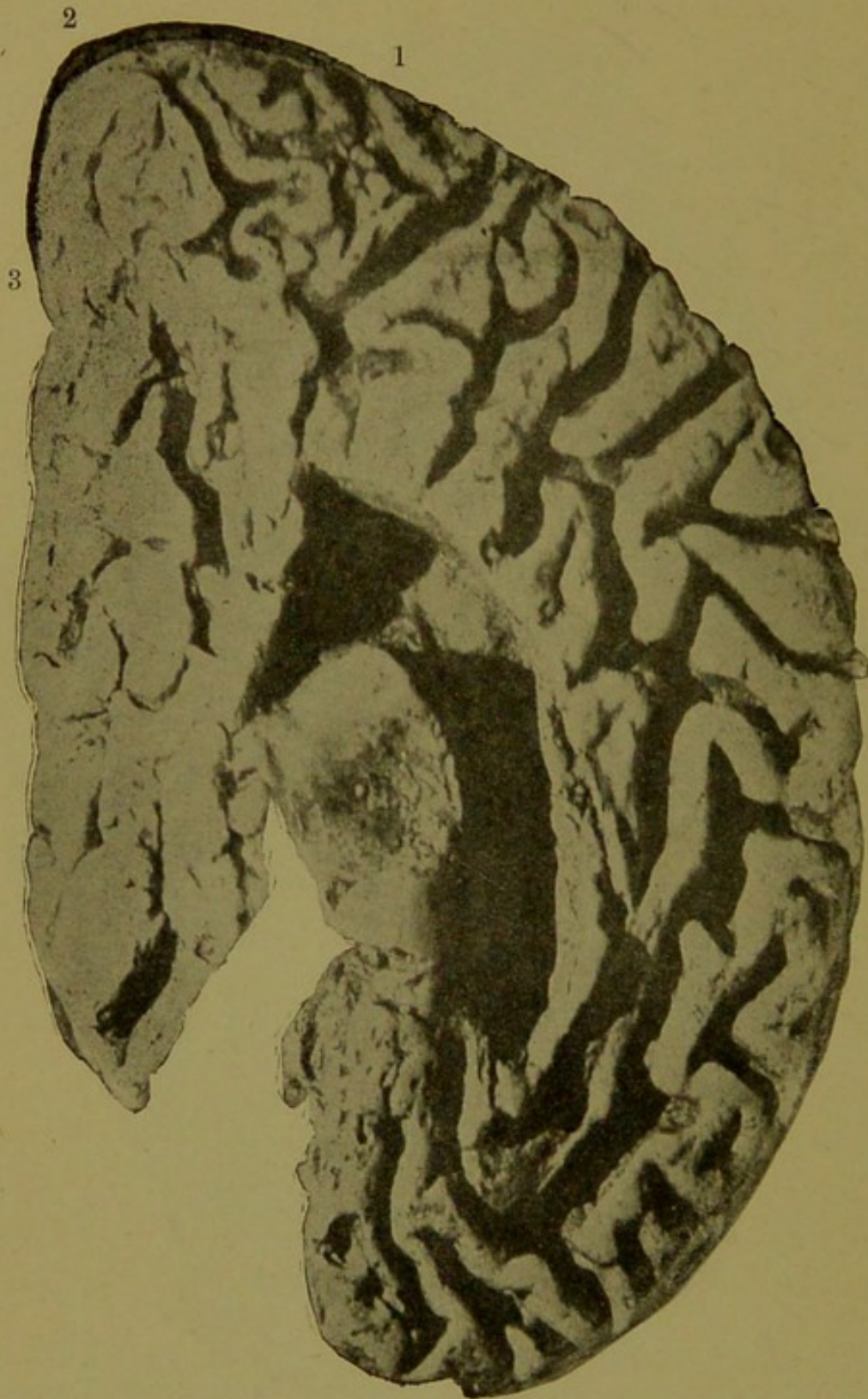


FIG. 3.—Left brain of Pequoit, a man of letters : inside surface exhibiting hypertrophy of the over-occiput and narrowing and shrinkage of the under-occiput. 1, the cuneus, highly convoluted ; 2, the calcarine fissure, of stellate or cruciform shape ; 3, the combined ligula and fusiformis crowded, narrowed, and shrunken.

have, on the one hand, thirty years of overstrained mental vision, and, on the other, thirty years of mental darkness. Let us compare gyri and sulci.

The brain of M. Pequoit, the man of letters, offers several peculiarities, but among the most prominent is the overdevelopment of the inside surface of the right occiput and seemingly corresponding overdevelopment of the outside surface of the left. At these two points the cortex has burst forth into a blossom or a star.

These stellate or rosetted formations are tetramerous or cruciform in shape, but are somewhat irregular, and the borders are finely accentuated by a lip or ribbon. The primary sight is apparently in the right hemisphere, the secondary in the left.

Comparing the two pairs of brains together, it is found that in the man of letters both calcarine fissures are expanded into crosses or radiant centres. Looking straight at these starry formations, it requires but small stretch of the imagination to picture them in life as flashing eyes or flaming asterisks. In the other pair the fissures are both tightly closed, like eyes closed in sleep or death. The cuneus, a lobule which also belongs to the visual area, is in the left hemisphere of Case II, the blind lady, completely atrophied, while that in the left hemisphere of Case I, the overstrained man of letters, is wide and highly wrought, and in the right hemisphere still further expanded, until it is no longer a cuneus but a quadrate. The whole over portion of the occiput presents a singularly hypertrophied appearance.

Taken altogether, the cerebrum of Case I shows hypertrophy of the over-occiput and a crowding and dwarfing of the under-occiput, while the cerebrum of Case II shows high and full growth of the under-occiput

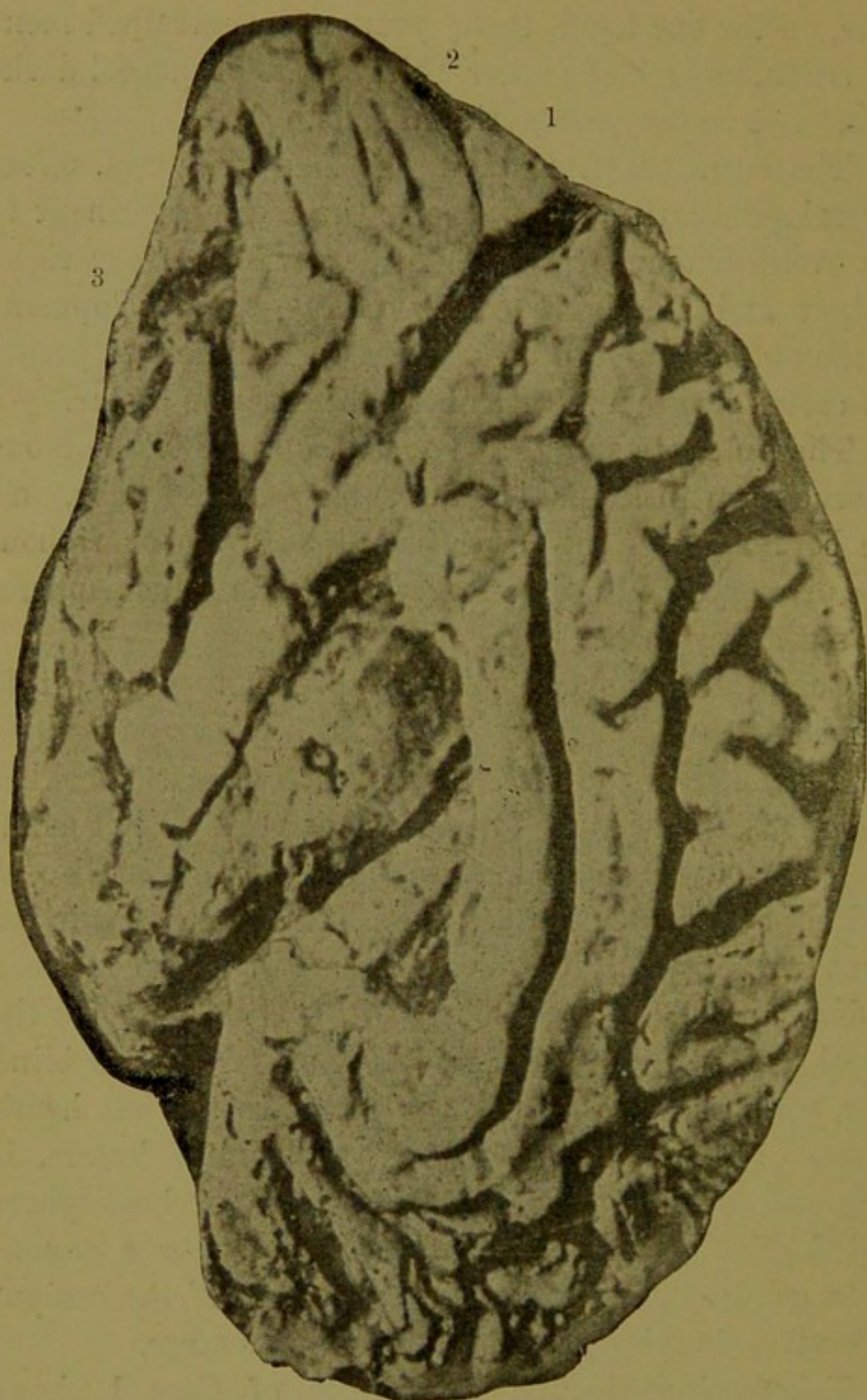
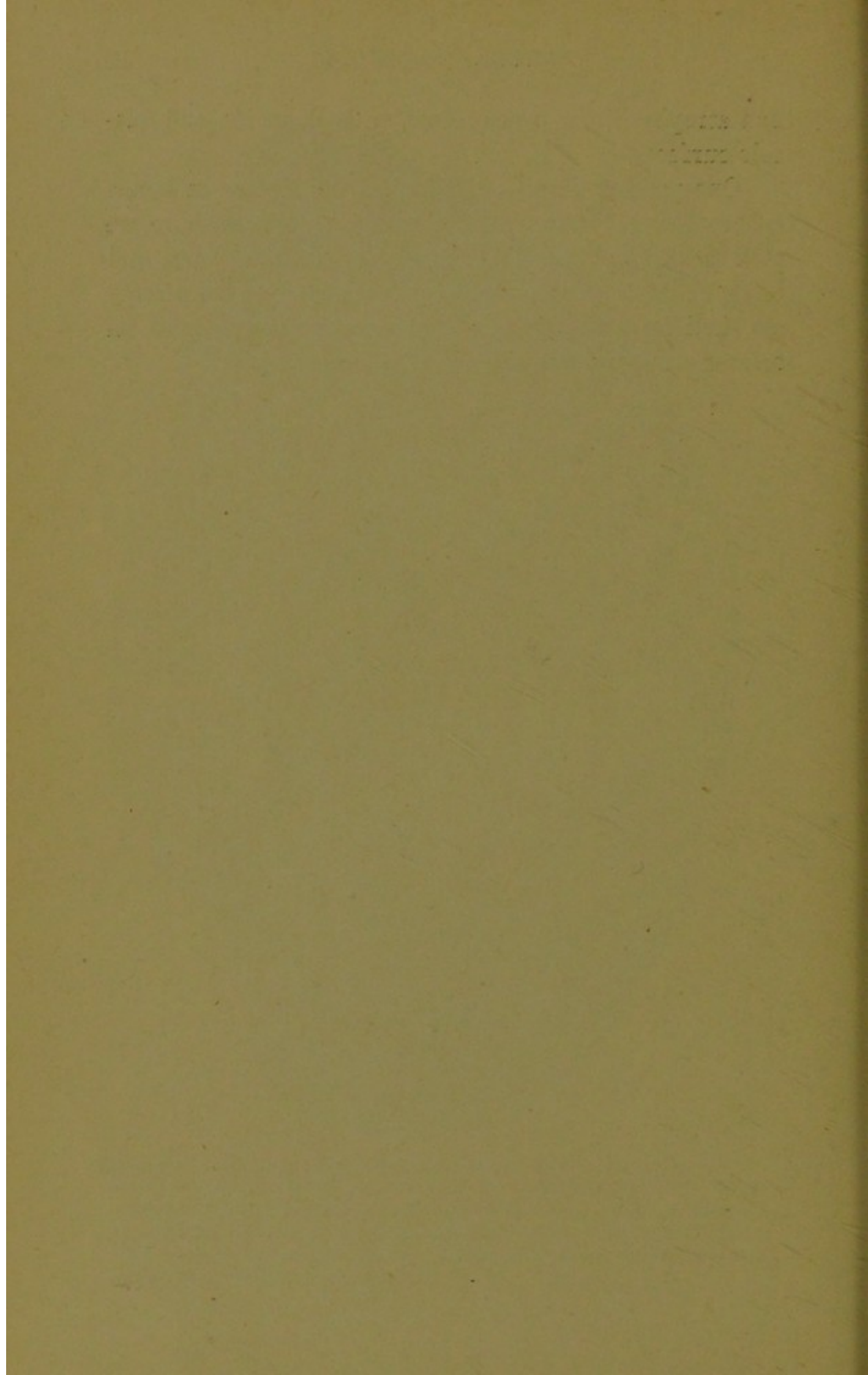


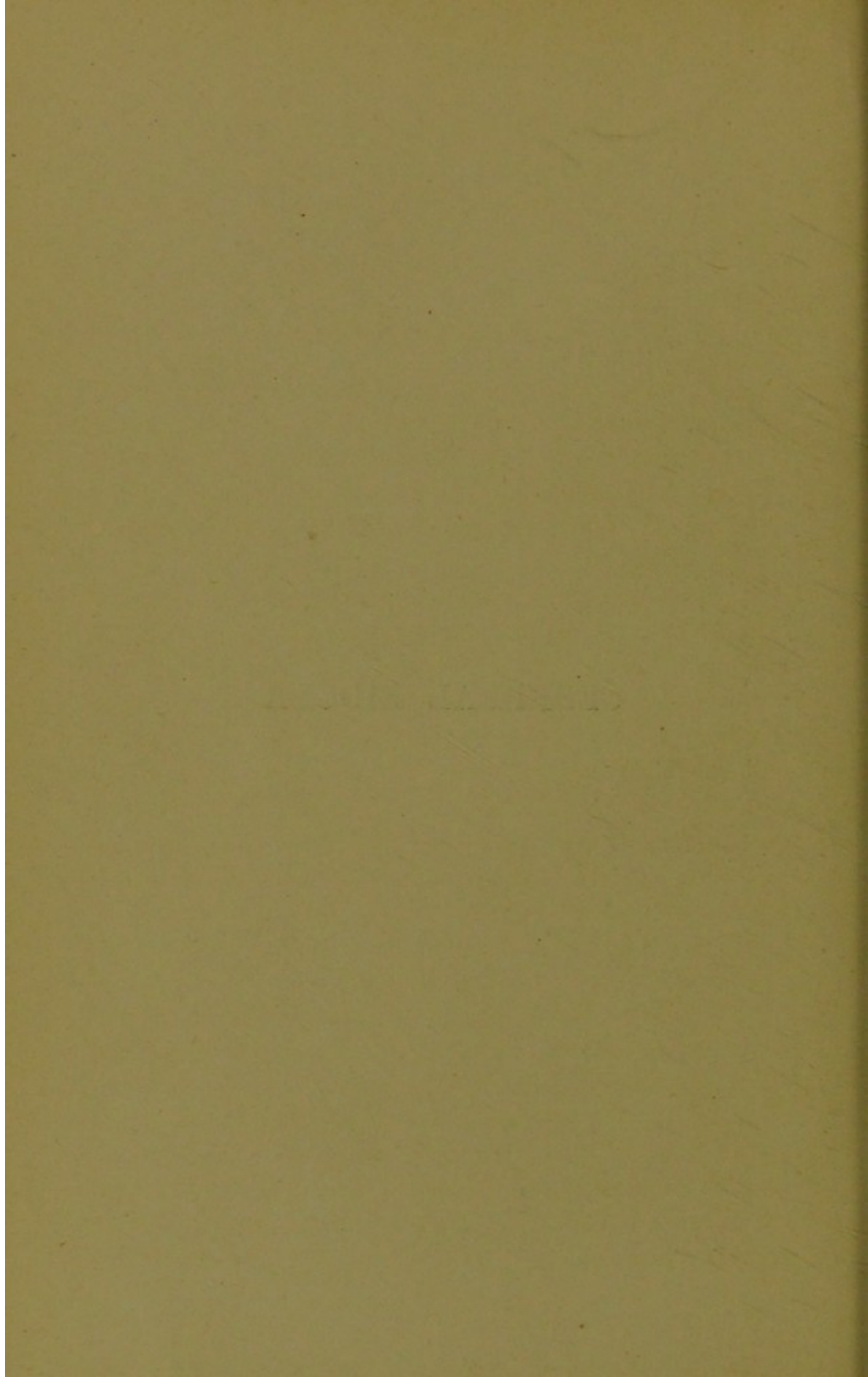
FIG. 4.—Left brain of Madame Rodin : inside surface showing atrophy of the upper occipital lobe and expansion of the under occipital lobe. 1, the cuneus, completely atrophied, reduced to a rudiment ; 2, the fissura calcarina, small and closed ; 3, magnificent development of the lower occipital lobe, which here dominates and occupies the entire space, exhibiting a condition the direct reverse of hemisphere No. 1.

and atrophy of the over-occiput on both inside and outside surfaces.

One parting glance at the calcarine fissure in hemisphere No. 1. Often in our walks by the seashore we pick up an empty shell and speculate upon the form and being of its once living tenant, but here we have a radiate shell from the shore of the great unknown, and its former occupant was the eye of a human soul.



CEREBRAL EIDOLA



CEREBRAL EIDOLA.

IF, without reference to the lore of gyri and sulci, one looks squarely at the cerebrum of a cat, *Felis domestica*, from the side, he will see sculptured in high relief upon the hemisphere the figure or shape of an ear. This "cat's ear" is not a vague shadow, but a most clear and striking form.

Possibly he may call it a fancied resemblance, and think no more of the matter; consulting the physiological memoirs, however, he will find that this particular spot on the cortex is the auditory area or centre of hearing. This cat's ear on the brain not only looks like an ear, but performs auditory functions.

It is not limited to *Felis domestica*. It is the most prominent feature on the cerebrum of lion, tiger, or panther, where its shape seems to dominate the entire posterior half of the hemisphere. One is impressed by the idea that with so great an auditory area as this *felis* must be a wonderful listener.

Naturally, the attention at this point would be directed to the auditory centre in other animals. Take first the dog, *Canis familiaris*; while the external ear of *felis* is upright, that of *canis* is usually drooping, and we find that the ear gyrus, the third from the margin, is in *Canis familiaris* also lopped or drooping, thus resembling the shape of the interior of the concavity of the canine outer ear.

In ovines and bovines the outer ear is erect. Is, then, the "cat's ear" or cerebral pinna to be found on the cranial surface of ox or sheep? At the head of the Sylvian fissure in these animals one discovers a triangular lobule seemingly identical in form and position with this auditory centre in *felis*, and looking at this formation in a series of specimens we are impressed with the feeling that we have here also the spiritual apparition in the cortex of an ear, the eidolon or simulacrum of the pinna, the outer auditory shell.

In *homo* this suprasylvian lobule is the gyrus supramarginalis, and when examined in the embryo, together with its accompanying gyri, and compared to those of the ox, one forms the impression that while this lobule stands for the pinna, the first temporal gyrus may correspond to the drum or middle ear, and the second or third temporals to the inner ear—that is, to the vestibule labyrinth. Thus to the whole auditory apparatus of the flesh without would correspond a whole auditory apparatus of the spirit within, and this sculptured plainly upon the cranial surface of the hemisphere. In other words, the ear of the flesh carves its spiritual counterpart upon the surface of the cerebrum.

We now take a step further. If there be literally a cerebral ear, why not a cerebral eye? The ovine, bovine, feline, and canine brains do not at first glance reveal it. In *felis* and *canis* the eye gyrus exhibits a long stamen-like shape, with a clubbed terminus. These eye scrolls or eye stamens are perhaps analogous to the stemmata of lobsters and insects, little stalked eyes, rudiments, and we know also that the mind's eye in these lower mammalia is certainly in a rudimentary state. The big mental eye is found only in creatures with hands, the

primates. Let us see the primate brain. Here, indeed, passing from herbivora and carnivora is a radically new type; its characters a lofty fissure of Rolando and a great round overhanging occiput. This back head, this round ball, so simple and beautiful in all the little quadrumana, so noble and wondrously carved in the great bimana, this is the big eye, the eye of the brain. Here is the optic centre, here the visual area. The calcarine fissure is the cortical retina, the occipital lobe is the cerebral eyeball.

It is a carving wrought by the spirit of sight; it is the simulacrum or eidolon of the external oculi; it is the shade or soul of the eye. At one pole of the optic nerve is the eye of the flesh, at the other pole is its immortal counterpart, the eye of the spirit.

Is this true? What is the occiput?—a visual centre merely, a visual map or area, a mere surface folded by hazard and convoluted by the accident of want of space? Shall we not rather say a living orb, a body more glorious than a star, a form within us more vital and more beautiful than the eye from which it sprang?

The evidence of our senses, our scalpels, and our microscopes at present all point strongly in the latter direction.

If we allow a cerebral eye and ear, why not a cerebral nose and tongue? Underneath the temporal convolutions lies a tract in the rhinencephalon variously called the hippocampus, the silkworm, the horn of Ammon, and the gyrus uncinatus. It is in this curious turbinate lobule that Ferrier has located the sense of smell. Here, then, we have to do with another spirit carving, for if we observe and reason right, the hippocampus, the little seahorse shape, is the cerebral nostril. It is cunningly

wrought. It is a coiled shell—so also is the external nostril. The essence of the act of smelling is a twist or torsion; the nostril is turbinate; when it scents anything pungent, like the nasturtium, it twists—as the very name of this golden-colored member of the cress family implies. This, then, is the eidolon we are seeking. The nostril of the body has carved for itself a nostril in the brain. This is what we should expect. To smell the actual and the present we require a nose of flesh; to scent the past and the absent we require a mental nose, and why should we conceive this to be without form or void? To scent the absent requires a well-formed nose of gray matter.

Let us still pursue our eidola. The sphenoidal pole or sphenoidal lobule is the seat of taste. At first glance this lobule shows no resemblance to a tongue, certainly no resemblance to a lingua; but we must know that the groove of taste which bears the name of tongue is at its essential and substantial end a very different form from that portion which is usually shown. The true gustatory organ is a bulb or stoma with a groove in it, and we shall find that the sphenoidal pole also is a bulb or stoma with a groove in it more or less clearly defined. This sphenoidal bulb then is the cerebral glossopharyngeum. In this study we must not look for an actual copy, picture, or reproduction, as the vulgar would see it, but we must search for the form of the essence or spirit, something less tangible, more beautiful, higher, more difficult to grasp. While the outer glossopharyngeum is of the nature of a carnal shape or *morphe*, the cerebral or psychical glossopharyngeum is of the nature of the higher form or essence, the *eidos*.

The sphenoidal lobule differs considerably in differ-

ent individuals: there is no accounting for taste, each one has his own, as also in different species. In the lion it is decidedly dainty, quite lingua form. It is well known that all felines have delicate or dainty taste.

Other parts of the cerebrum are, if we mistake not, more fearful and wonderful still. The lower occipital lobe appears, both by its form and position, to be a kind of reverse of the lower temporal lobe; somewhat as in the organism the cloaca is the reverse of the stoma, or the splanchna are the reverse of the œsophagus or pharynx. The under occipital lobe is composed of two parts, the ligulate and the fusiform lobules, the pair presenting the appearance of the two parts of an apparatus or organized whole.

It would, perhaps, be hardly correct to call this lobe phalliform, for it is not always so: it resembles variously a cone, a bulb, a heart, a bud, a flower; it is a conus or conoid, an anthos or antheroid. It is safe to say that it simulates some of the manifold forms of the generative spirit as found in Nature and in art. If we seek to know the shapes in which the generative spirit—the spirit of birth and beauty—manifests itself, we shall find that the field is wide. We must first pass in review all the stamens and pistils of vegetation, and not only these, but all fruits and flowers; next the essentials and accessories throughout the animal series, not forgetting the platyelmintes and the mollusca. In art, such shapes as the Assyrian cone and *fleur-de-lis* and anthemion, the Greek anthemion on the vases and the closed anthemion, the egg ornament, the tongue ornament, the stele, and the primitive obelisk. Little by little we come to see that the most general types of all this matter are the conus, the anthos, the lotus, and the anthemion. These

are the symbols of love and birth, generation, *antithanōs*, the force that saves from death. Thus, then, we arrive at that third field, the cerebral, which is neither nature nor art; and if one examines with care the lower occipital lobe of the mammalian series he will, I think, find strong grounds for the conviction that he is looking at the very flower of the sacred *arbor vitæ*, the tree of life—of life immortal, since it is for the preservation of the race.

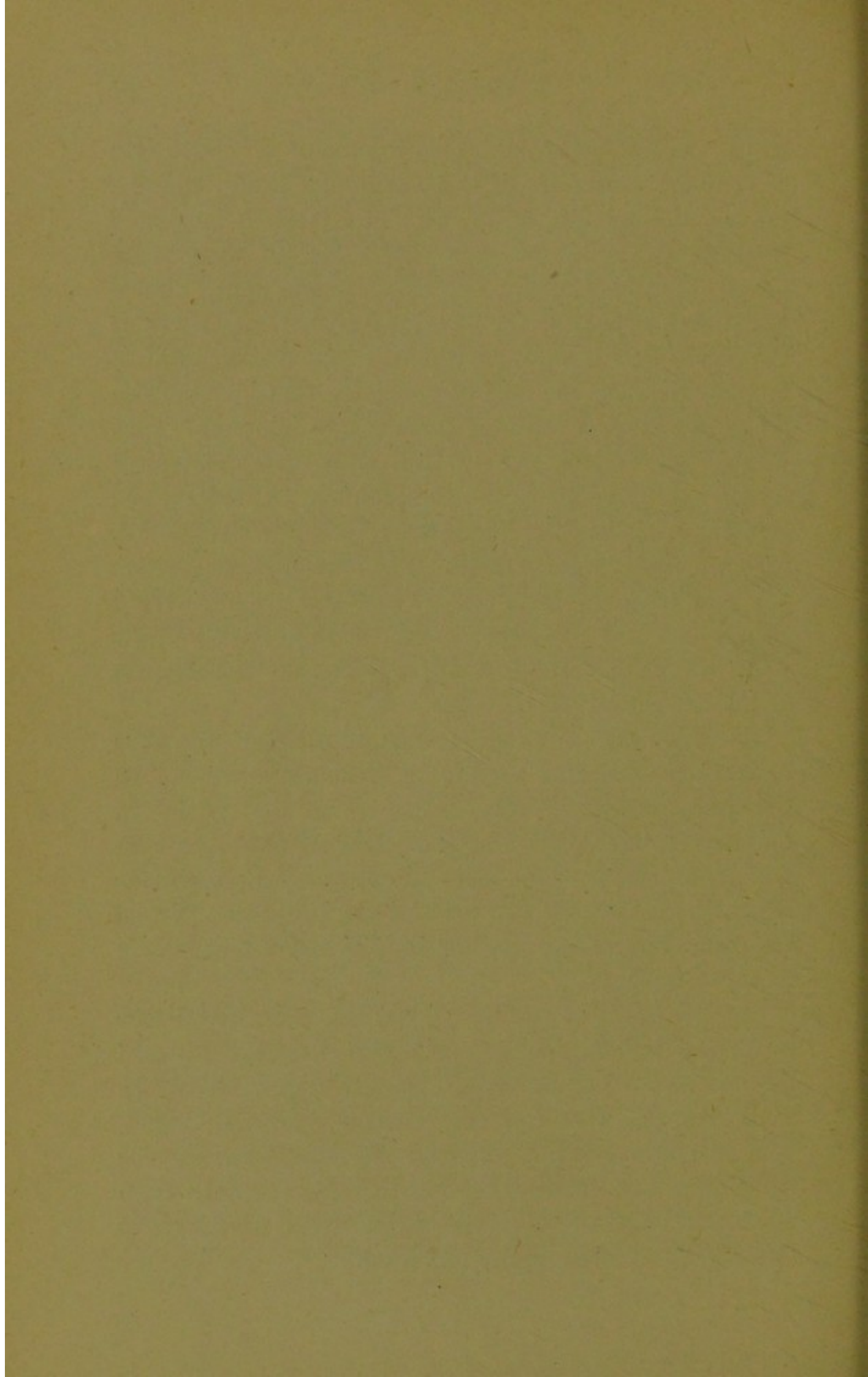
Thus it is maintained that the lower occipital lobe is the psychical *conus* or psychical *anthos*, as the over-occipital lobe is the psychical *ophthalmos*. Further investigation may show that the two are intertwined.

Let us next consider the Rolandic region or the *lobus centralis*. This consists of the ascending frontal and the ascending parietal convolution, or, according to newer nomenclature, of the precentral, postcentral, paracentral, and infracentral gyri. The region is marked on the localization chart by such names as leg, shoulder, arm, thumb, fingers, face, etc. Shall we then expect here to find a spirit face and a spirit hand sculptured upon the surface? Here surely the hypothesis breaks down. Surely there is nothing of this sort to be found about the fissure of Rolando, nothing, indeed, that in any way resembles bodily limbs or members. If the idea is true at all, however, it must be true here, for the central lobe is the most decided and salient part of the brain, both in form and function. In the first place, then, we must note once more that we are not in pursuit of a realistic copy, picture, or reproduction, but of a spiritual semblance, the form of a spirit or essence. Let us, therefore, first ask what is the essence or true form, the essential form of locomotion or of a locomotor apparatus, for this *lobus* is the sensory motor of the corporeal appa-

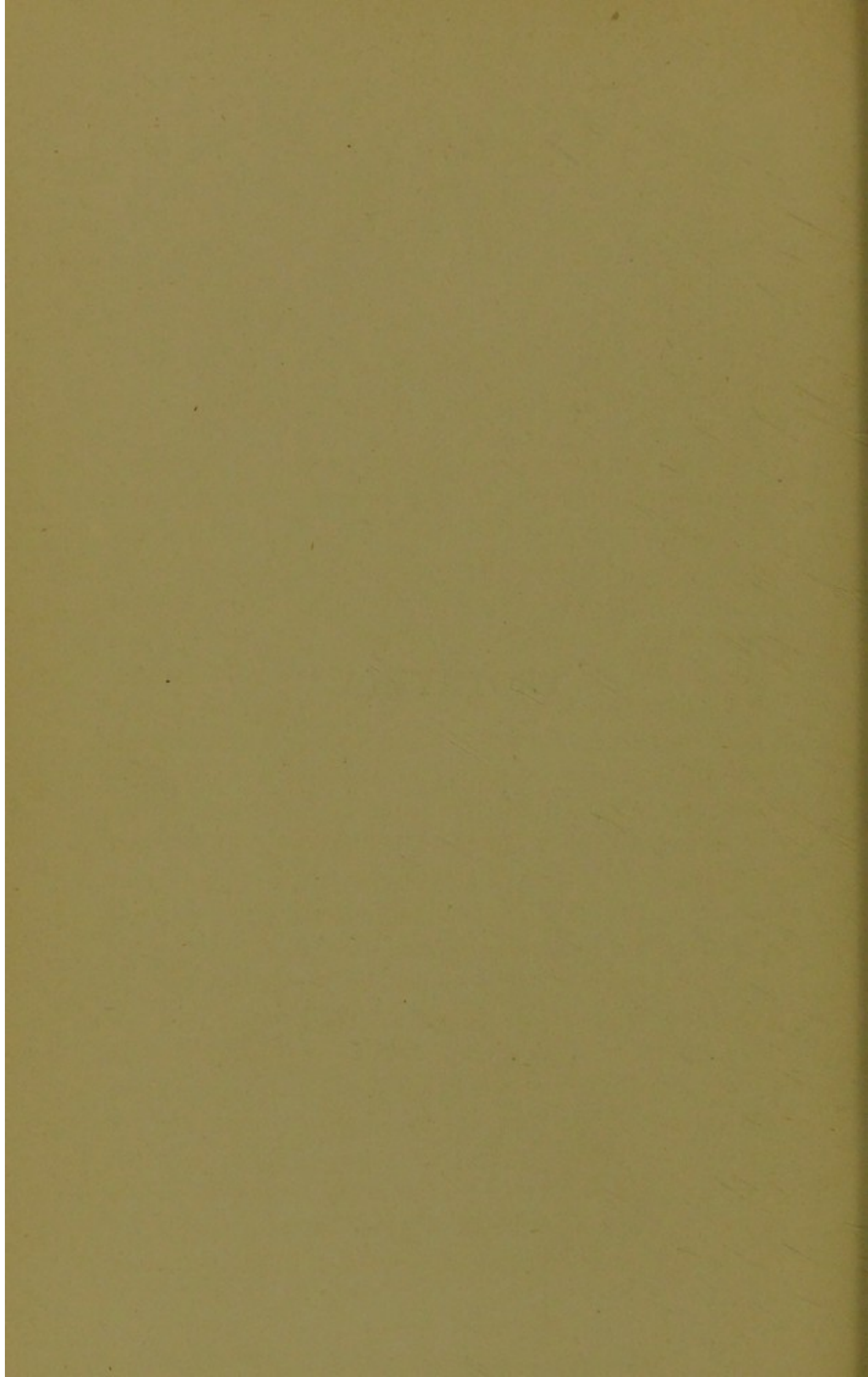
ratus, the locomotorum. This locomotor or motor is a mechanism consisting of three swinging limbs, the pes, manus, and maxilla, or leg, arm, and jaw. A moment's thought will suffice to show that either of these three pieces of mechanism is in essence a "toggle joint." Such is the archetype; the leg of a grasshopper may serve as the type. Now if a good specimen of the human brain is brought forward one may demonstrate perfectly the Rolandic region as a chain of three toggle joints or "knee joints" or "elbow joints" (all these are mechanical terms), the first being the cerebral leg, the second the cerebral arm, the third the cerebral jaw, the last curved, perhaps, rather than jointed. The first of these is literally and truly a "knee joint," and the second, with a clearer cut and a sharper curve, most truly an elbow joint, while the third is a curving jaw, the simulacrum of the maxilla which it moves.

It may seem somewhat strange, if not startling, thus to imagine ourselves examining a man's limbs not in the flesh, but, as it were, in the spirit that is not in themselves, but in the mirror of their psychical or cerebral counterparts. The more one observes the more one is convinced that the two poles of the projection system are counterparts—an eye for an eye and a tooth for a tooth, so to speak.

In the brain of the lion, *Felis leo*, the frontal lobe is formed by four hook-shaped gyri reaching forward like semi-outstretched arms, strongly suggestive of the hind feet, the fore feet, the maxilla, and the lingua. The first crouches and springs, the second strikes, the third grips and crushes, the fourth rasps the flesh from the bones. The eye gyri, the ear gyri, and all others in this royal animal are quite remarkable.



PROTHYMIA



PROTHYMIA :

A NEW FACULTY AND ITS LOCALIZATION.

SOME four years since I began preparing the brains of domestic animals by the dry process. The following is the method: I pass the specimen successively through nitric acid, bichromate, carbolic, glycerin, and oil of cloves. I then paint it, varnish it, and reproduce six copies in plaster and in photography. My studies have been chiefly swine and rabbits, felines and canines, horses, and some fifty cattle. The collection so formed I took in part to Europe last summer in order to compare these brains of domestic animals with the two collections of the brains of wild animals, one in the College of Surgeons, London, the other in the Jardin de Plantes, Paris. At both places I was offered every facility. At the Jardin de Plantes I was given a special room, and the jars were opened for my inspection. I was also presented with copies of the brains of two lions, one lioness, one American black bear, and one Indian panther. For such kindness as this, what thanks are adequate? I was much gratified at obtaining these specimens. I was, for instance, able to compare the brain of an Indian panther with that of the Newfoundland dog, and the brain of the African lion with that of an old New York working horse of very good breed that had died in harness, a specimen that had given

me no end of pains and cares. By a six months' study of these two collections, comparing and contrasting them with my own, I seemed to find further proof of the existence or localization of a cerebral faculty with which I had already been strongly impressed while working upon the domestic animals only.

In making my collection the region to which I had directed all my attention was the inner-under surface; the point, therefore, which is the subject of this brief article was unlooked for and was gradually forced upon me. I noticed an extraordinary roundness and fullness in the coronal or metopic region of the hemispheres of certain cows and horses, contrasting in a surprising way with the same region in other animals. I had this same roundness, this forwardness of front, forced upon my view when looking at the mesial surfaces of the brain of the Newfoundland dog, the terrier dog, and the sheep.

Following are the observations:

The metopon, or anterior metopic lobule, in the Newfoundland dog presents an appearance of swelling forward, or pushing or surging forward, while that of the pug dog shows a contrary tendency: it seems to slope or sag and hold back. This same forwardness of line or curve in the horse is so strong that, comparing it with the run of brains in the animal series, it seems almost, as it were, tremendous or "prodigious."

This same willingness to come forward I found in the mesial metopic line of the black-and-tan dog, and this same unwillingness to come forward in the brain of *Felis domesticus*, the cat of either sex.

The grand arch line of the brain of cats, as seen from the mesial surface, shows a back-upwardness, while that

of good dogs shows a forwardness or forward-upwardness.

This round-coming form of the coronal struck me first in the cerebrum of the Newfoundland dog, next in the cow and horse. I have thought that the left hemisphere showed it more than the right; it is "always" the left hemisphere, however, that is typical. This coming-round form, this willingness to come forward in the curve, I found prominent in the sheep and wanting in swine. The brain of the sheep comes forward willingly, the brain of the swine comes forward unwillingly.

The normal or native appearance of the brain of a wild animal, and of many or most domestic animals, is that of a life pulling or arching itself in a direction backward-upward. The form that I am seeking to describe seems a contrary tendency or effort.

If we essay to translate this metopic or coronal curve into the language of psychology, would not the quality be eunoia or prothymia? This willingness to come forward, is it not mental as well as cerebral? The horse comes forward willingly to be harnessed; the cow comes forward willingly to be milked; the dog comes forward willingly to fetch a stick from the water, and the sheep comes forward willingly to have its wool cut or its throat cut, or whatever you like.

We turn now to the contrary mental disposition: the pig comes forward most unwillingly, the domestic cat comes forward always with a mental reservation. The temper of the pug dog is, I believe, quite unlike that of the Newfoundland dog. As for the wild cat, the lion, the panther, or the wolf, suffice it to say here that they do not come forward with their metopic lobule or mesial metopic curve, but with something else, not with the

metopic centre, but with another centre. It seems to me that what I have found is true. As a pupil and follower of Broca I know how hard it is to ground with scientific certainty even the smallest point, but I believe this can be grounded.

INTENTION



INTENTION :

A STUDY OF THE BOVINE BRAIN.

IF by chance the student or professional man should ever receive into his hands the brain of a bullock direct from the axe of the headsman, he will have occasion to note how full, round, and firm appears the occiput or posterior half, and how flaccid, empty, and pointed in shape appears the sinciput or anterior half.

One naturally asks the reason of this, and the answer would be that the posterior half of the cerebrum is the receiver and holder and the anterior half the transmitter and driver. The posterior, round and hard, is plumped full of impressions; years and years of memories are there stored up in innumerable folds, sights, and panorama slides; innumerable pictures of summers and winters past fill one section, while the corresponding noises, melodies, and voices fill another convoluted mass. Samples, minute yet true, of all the grass and hay ever eaten fill the taste compartment, while in the lowest coil are stored the odors of all the meadows and pastures and the smells of the woods and the marshes. The smell gyrus, indeed, in cattle or dogs, or in any mammal lower than a primate, may well seem to us poor microsmatics a marvel of development. This posterior half has also a full store of kicks and cuffs, of pushings and pullings,

of combings and caressings, of milkings and yokings, and a thousand forms of contact; and the all-powerful impressions of sexuality and parentality have also there a chamber or place. So it is no wonder the posterior half is round and hard and full.

On the other hand, the sinciput is not a storehouse of these rather worldly and substantial impressions. While the posterior half holds, keeps, combines, arranges,

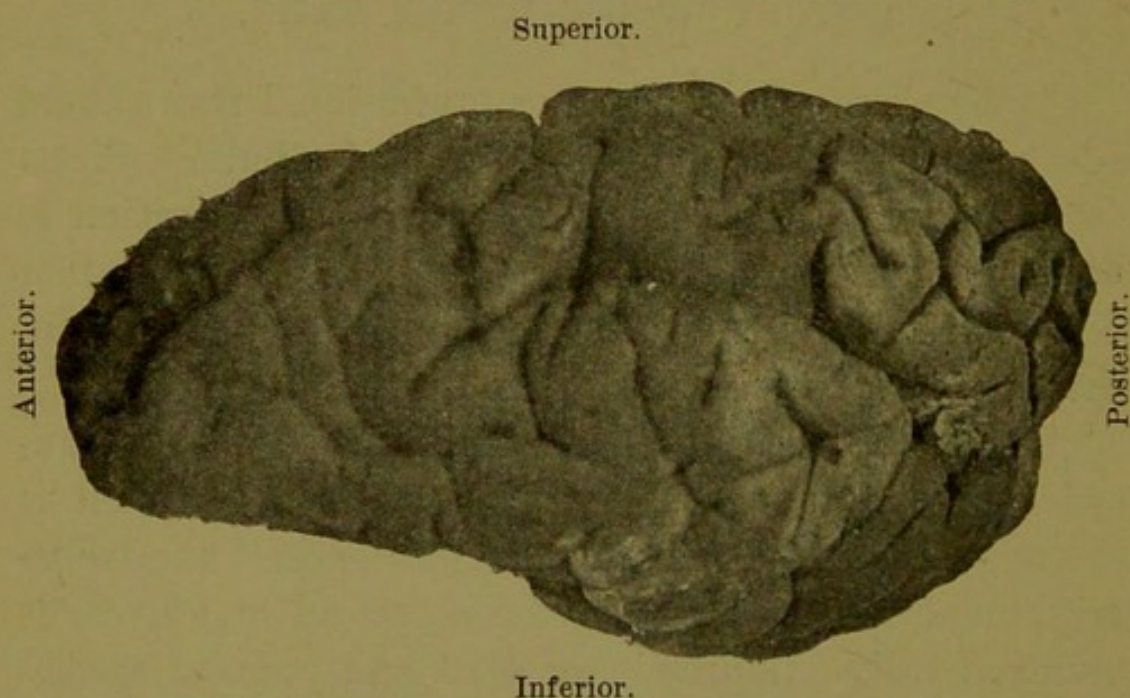


FIG. 1.—Left brain of an ox, exterior surface. The occiput or posterior half is large, full, hard, and well rounded; this is the receiver and store. The sinciput or anterior half is smaller, softer, and triangular, like the apex of a pyramid. High on the plate to the right is seen the serpentine eye gyrus, or store of sights, and below it, triangular in shape, the ear gyrus, or store of sounds. In the direction anterior-inferior is seen the great triangle or junction, the seat of the attention. Between this and the other parts lies the chasm or vortex of action.

and rearranges these samples of worldly goods, the anterior end, the point of the pyramid or cone, calls up and transmits the impression or combination required.

The functions of the posterior half are hearing, seeing, smelling, tasting, feeling, and passion; the func-

tions of the anterior half are attention, intention, phona-tion, and action.

What is attention? Let us see. A bovine animal in the pasture hears a clatter and sees a glare: the creature stops and stands fixed, "all eyes and ears." What is happening? We may say that the concentrated or anterior end of the brain, the apex of the pyramid, is endeavoring, through the longitudinal or cogitational system of nerves, to call up all similar sights and sounds from the stores of the past in the posterior half and to unite them with the actual present impression. When this is accomplished and recognition is reached, the creature acts. He knows, for instance, that this clatter and glimmer means salt, and he rapidly moves toward the approaching sight and sound. Attention becomes intention, then action, accompanied very probably by phona-tion.

Where shall we locate these functions? The cerebral eye and ear—that is, the store of sights and sounds—have been found to be respectively the second and third gyri, posterior, counting from the upper margin. The eye gyrus in cattle has much the shape of a stamen, a serpent, or a stemma; it is double or cleft, however—that is, marked by a central groove or fissure. The ear gyrus below it curves sharply, forming a haunch—the temporal eminence—and this eminence, triangular always, with a central incision, bears a certain resemblance to the external bovine ear.

If, now, we place our pencil or finger upon these two gyri and move forward across what appears to be a central chasm, and which must be the chasm of action or place of the descending current, we shall find ourselves at a point of the anterior where the two gyri

meet. This anterior junction then is to be regarded as the *locale* or point of attention. Association fibres from this centre must radiate to the eye centres, to the ear centres, to the smell and taste centres. This exterior point, then, is the central office, the seat where sits the man that *knows*. The bullock knows that this sounds like coming salt, looks like it, he knows it is salt.

Having *attended* to this, he now *intends* to obtain his share. Where shall we locate intention, where find or seek for that famous *boule, vole*, that might of almighties for good or evil, the will?

Where is the *boule*? Where is the intention?

In making dry preparations of the brains of fifty cattle—male, female, juvenile and neuter—I found that the bull brain is distinguished by a highly developed prow or prorean lobule, and this upon the mesial or inside surface. In other words, the bull has a tremendous cerebral development exactly *between the eyes*; while the brains of his sisters, the cows, have usually no such development of folds and fissures at this point, and his unfortunate brothers, the oxen or bullocks, if weighed in the balance as to their mesial prorean lobules, will be found very much wanting.

That Taurus, the bull, when in full maturity and at the height of his power and splendor, is one of the noblest of the Creator's works all will concede; but what is that peculiar, that transcendent quality which, from the days of the pyramids of Egypt and the worship of Apis to the last days of Spanish rule in the West, has made this creature so respectable, so redoubtable, so admired and feared?

What is this bully good quality? Is it not the will, the intention, the *boule*? Whatever it is, I am strongly

of the opinion that the centre or seat of it is between the eyes, and that it is definitely to be located in the prow, the prorean region, the prorean extremity of the mesial surface.

Once more, What is the quality? Let the mind for a moment look back to the herd of cattle in the natural

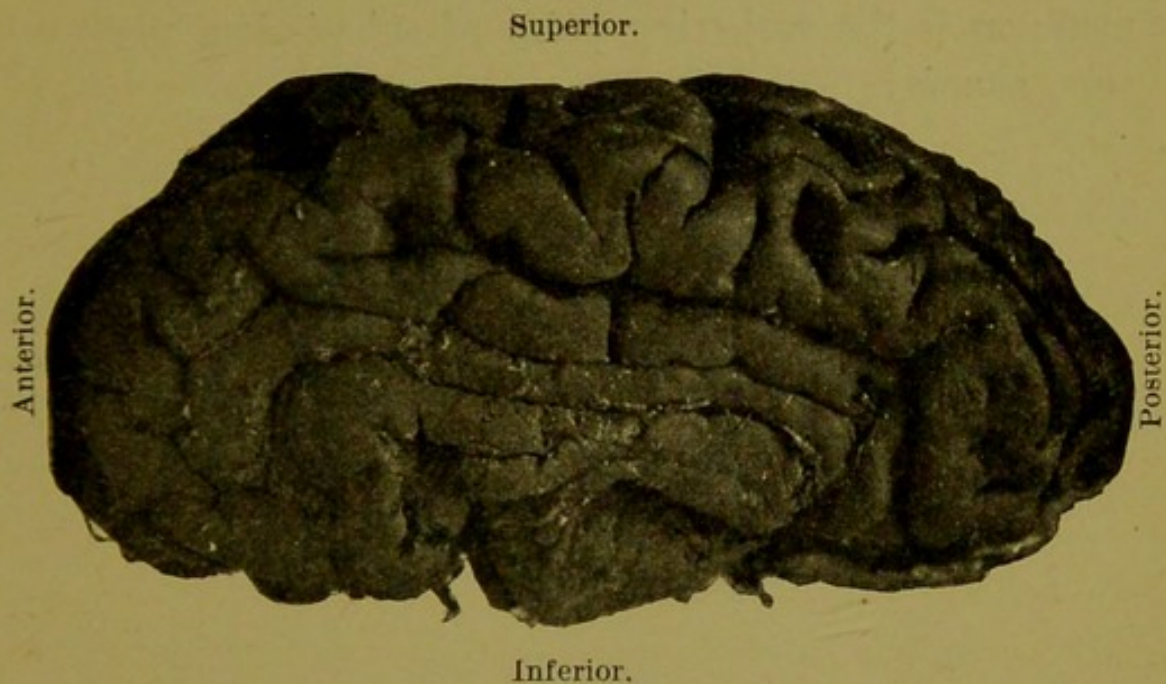


FIG. 2.—Right brain of a mature bull, inside surface, from the "Wild West." The prow or anterior extremity is differently shaped from that of the ox. It is highly convoluted and highly fissured, showing a powerful development.

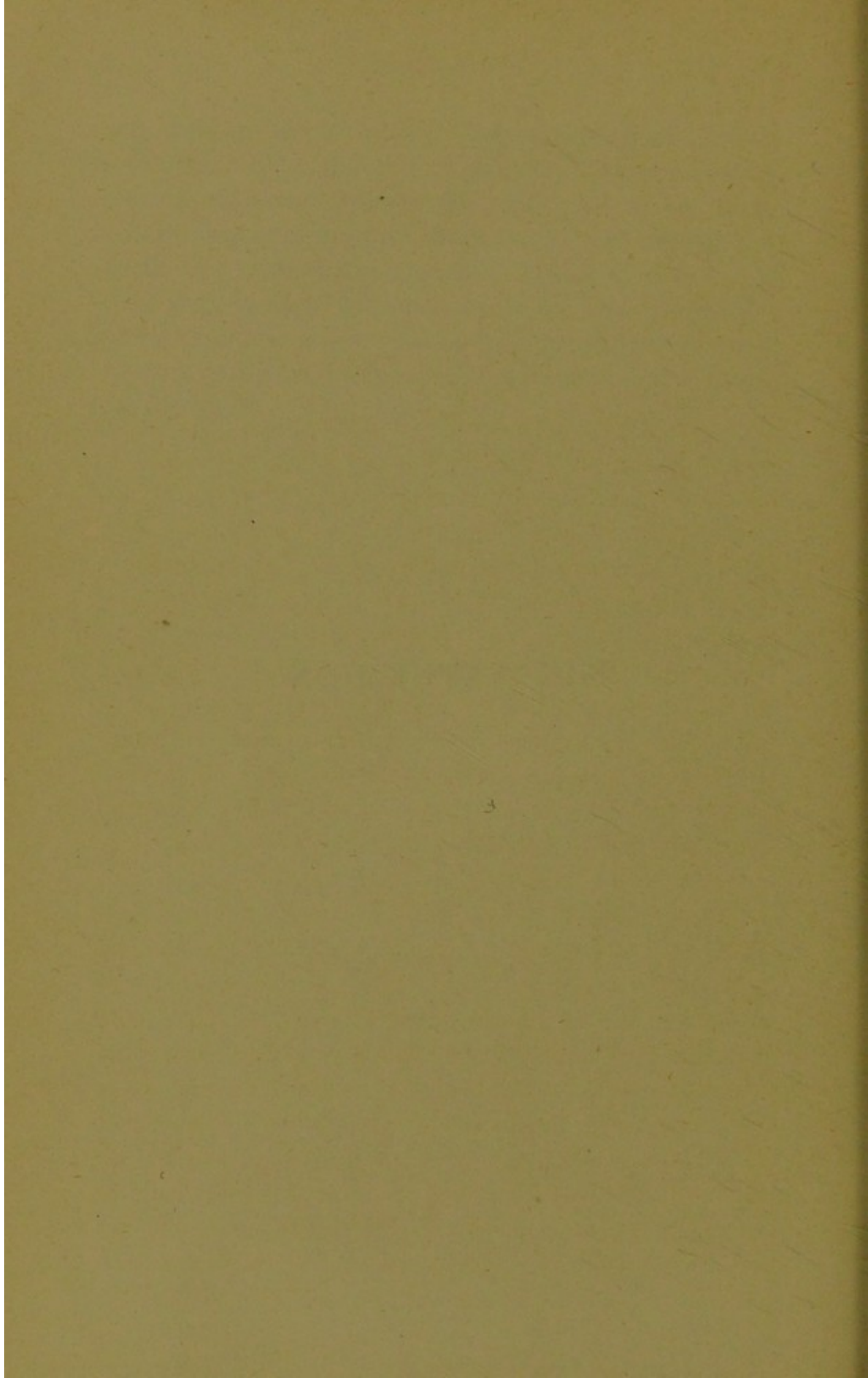
or wild state—the bully good quality then will be seen to be this: the intention, the determination to protect or defend.

It is the *boule*, the *vole*, the tremendous intention or determination.

What are your intentions? A question of vital importance if you stand in a lone pasture with this famous and formidable animal approaching you. *Where* are your intentions? is the question less vital, but not without interest, that you ask as you hold the left bovine

semicerebrum in one hand and the scalpel in the other. And I should be inclined to answer, "In the prow." Observation seems to show that the brain of the male bovine tends to a prorean development, and that of the female to a metopic development. If this is true, would it not suggest that the prow may be the seat of determination, intention, the βουλῇ, strong will, while the metopon is the gathering point of submission, willingness, *eunoia*?

THE ANTHEMION

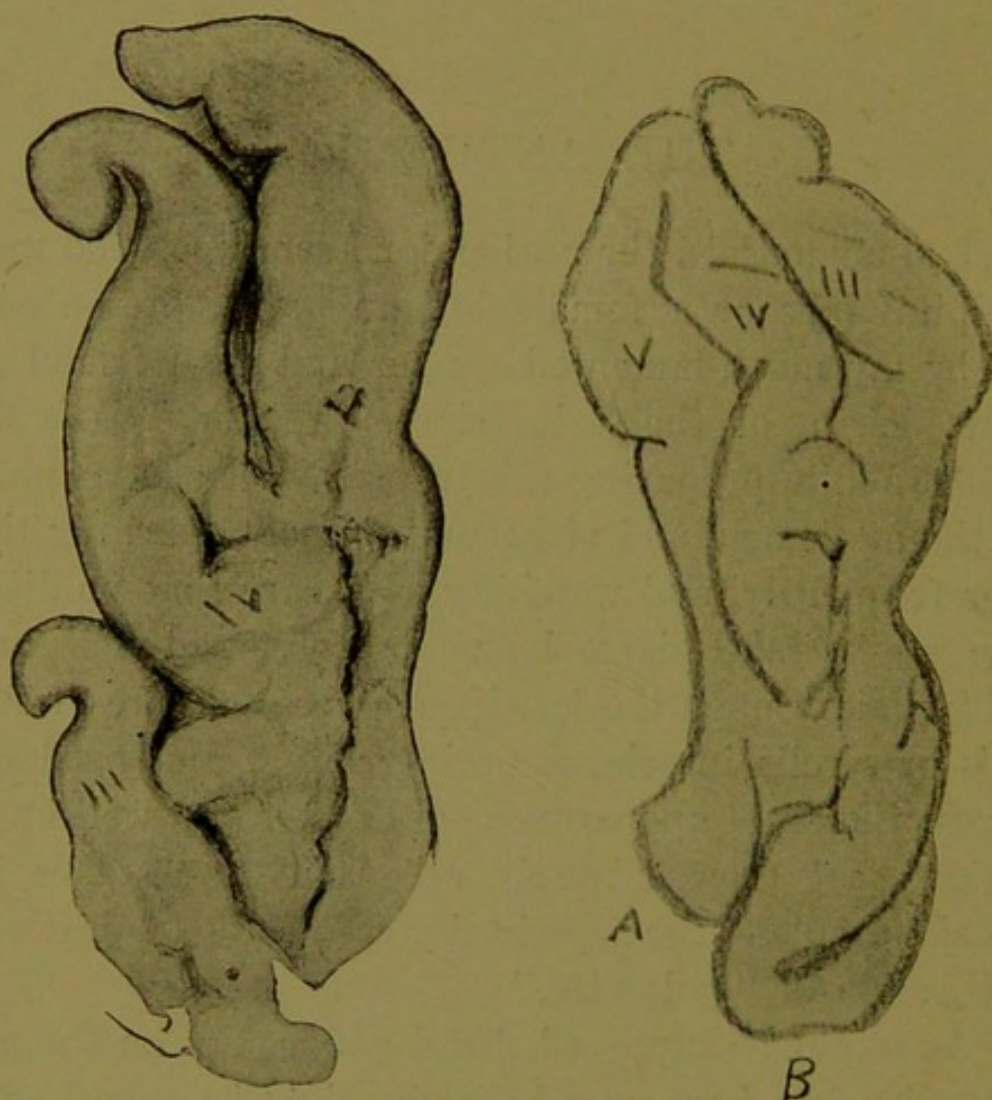


THE ANTHEMION.

I FIRST noticed the anthemion form upon the under occipital lobe of a female human brain, presented to me by my much-lamented master and kind friend August Voisin, of the Salpêtrière, on New Year's day, 1896. While preparing the two separated hemispheres by the nitric acid and bichromate process, turning them over frequently, and watching with care that no distortion might take place, I one day observed sculptured quite plainly upon the left hemisphere a figure of three foils or scrolls interlaced or interlying, and producing almost the exact appearance of the half of a well-known design that crowns nearly all Attic tombstones and Greek temples—the mystic flower of life in death the anthemion or “palmette.”

As might be supposed, I did not look upon the matter seriously. I presumed that it might be a mechanical or vegetative accident and without physiological or psychological significance. Nevertheless I made a note of it, and two months later while engaged in the preparation of a series of the brains of cattle, I was most certainly surprised, not to say startled, when I found that the under occipital lobe, which in bulls and cows is very large, and is indeed the only occipital lobe, presents to the naked eye an appearance which it seems to me can be nothing else and nothing less than the famous an-

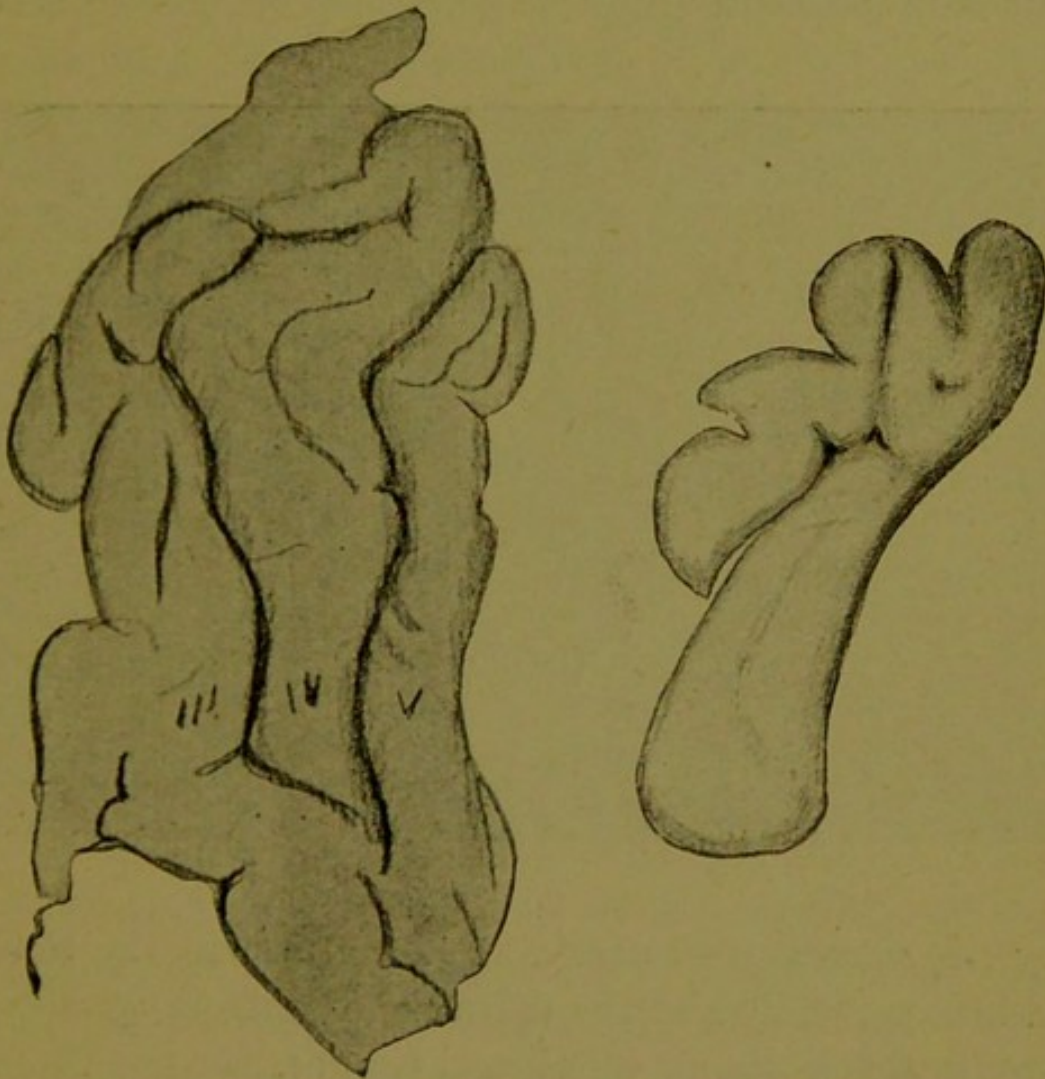
themion entire, right half on the right hemiserebrum, left half on the left hemiserebrum, the anthemion, the immortal flower, stamp and symbol of the life of the



race. My mind reverted at once to the "sacred tree," the arbor vitæ, with its mystic flower the anthemion on the Assyrian monuments, where also, singularly enough, it is often figured as butted by rampageous bulls.

The question then arose, Could the ancient Egyptians, Assyrians, and Greeks, with whom the anthemion was in constant use as a sepulchral device, have known of this analogous appearance upon the under occiput of

men and cattle? The answer is No. The well-known sepulchral design and symbol is in its origin distinctly floral and not animal or cerebral; it is derived probably from the lotus or water lily, a plant which exhibits in striking clearness the "heart of the flower," that peculiar staminate-pistillate interscroll formation by the function of which the life of a race is preserved from



extinction, well taken as the emblem and guarantee of perpetual life on earth.

The anthemion or mystic flower of the tree of life as a sepulchral design originated in Egypt, passed to

Assyria, and culminated in Greece, where it assumed two exactly opposing forms: one is the convex or male anthemion which, as a rule, crowns the Greek tombstone or Attic stile, which, we must remember, was in its origin a conic pillar; the other is the concave or female anthemion, a design plentifully strewn over all the Greek sepulchral vases. We rarely find the female anthemion on the sepulchral cone, and never the male anthemion on the sepulchral cup. We see indeed how



fitly the convex or overbending flower crowns the cone, and how perfectly also the vulvalike or outrolling flower becomes the sacred or sepulchral chalice.

The sacred flower both in the convex and concave form has passed into civil architecture, and known as the palmette, is one of the most common of the classic designs.

The anthemion form prevails in the brains of horned

cattle and in horses. In cattle I have once or twice observed that the curves seemed to correspond to the curves of the horns, a correspondence that need not surprise us, as the anthemion and the horns are both doubtless to be regarded as secondary sexual characters. When we pass to the primates the form is very apt to be suggestive of the phallic. In many cases upon both male and female brains of primates the linguates and fusiforms combine to make a piece of sculpture that seems an echo of the sepulchral pillar, and that echo not far distant. I should hesitate to give the under-occiput of primates any such name, as I should hesitate to designate a tombstone by such a name. The proper term would be perhaps *anthemion*, *anthos*, or *cone*. Taking all the mammalia together so far as I have been able to observe in the collections of London and Paris, and in my own collection, and in plates showing the region, I find sculptured in the under-occiput three sepulchral forms: the anthemion, the caduceus, and the conus, the last appearing to be the type in the primates. Other forms appear, however, which will, I believe, prove to be not less significant.

These figures in art represent a transmuted or transfigured sexuality; it appears to me that the protencephalon, the great brain, is also of a psychical or spiritual nature as opposed to the flesh without and below, and though it appears that the sculpture of the under-occiput of any mammal is, strictly speaking, a sculptured spiritual apparition in the cortex of the urogenital apparatus, yet if this should prove to be true we ought doubtless to be careful concerning the nomenclature, the enunciation of the doctrine and the applica-

tion of the theory. *Facilis descensus* is as true in science as in life, and any system whatever in the range of the medical sciences ought to convey the uplifting and curative idea rather than its contrary. There is reason to believe, moreover, that attachment in the sense of friendship, kindness, charity, and the love sentiment has a grounding in the forehead.