

that conditions favourable to observation in the northern hemisphere occur. The "comet-seeker" properly so called is an instrument much better known on the continent, and probably in America, than in this country. It may be used for much other useful astronomical work, and if the observer is content to be without equatorial mounting, and rely upon star-maps for ascertaining approximate positions, a first-rate instrument of this class need not involve great outlay. It is true, we believe, that the fine comet-seekers of the kind produced by the continental opticians (those of Berlin and Vienna especially) have, like most other things, increased in their cost during the last twenty years or so, but less perfect instruments would doubtless enable an amateur to do excellent work in the above direction.

TO FIND EASTER

A NEW York correspondent sends us the following rule, which he states to be devised by himself, to find the date of Easter Sunday, perpetually :—

To find Easter "for ever."

Divide	By	And call the	
		Quotient	Remainder
The year of our Lord	19	—	a
" "	100	b	c
b + 8	4	d	e
b - f + 1	25	f	—
19a + b - d - g + 15	3	g	—
e	39	h	—
32 + 2e + 2i - h - k	4	i	k
a + 11h + 22l	7	—	l
h + l - 7m + 114	451	m	—
	31	n	o

n is the number of the month of the year and o + 1 is the number of the day of the month on which Easter falls.

PROF. FLOWER'S HUNTERIAN LECTURES ON THE RELATION OF EXTINCT TO EXISTING MAMMALIA¹

VII.

THE Carnivora, as existing at the present day, form a natural group, though very sharply divided into two distinct sections, the Pinniped or aquatic, and the Fissiped or terrestrial forms. The former include the Seals, Walrus, and *Otariae* or Sea-lions. They differ from the terrestrial carnivora chiefly in modifications of their limbs to suit a semi-aquatic life. In their dentition they also present striking distinctions. Though they have the small incisors, large, pointed, recurved canines, and more or less trenchant molars characteristic of the order; the incisors depart from the typical number of three above and three below on each side, so constant in the other division, being always less numerous, and the molars are simple and uniform in character, never having one tooth differentiated as the sectorial, and others as tubercular molars. The walrus offers a most remarkable modification of dental organisation, which, being unaccompanied by any other deviation from the general structure of the group affords an important caution against placing too great reliance in classification upon characters derived from teeth alone. It must, however, be noted that a knowledge of the complete dentition of this animal in its early stages shows a nearer conformation to

¹ Abstract of a course of lectures delivered at the Royal College of Surgeons "On the Relation of Extinct to Existing Mammalia, with Special Reference to the Derivative Hypothesis," in conclusion of the course of 1873. (See Reports in NATURE for that year.) Continued from p. 450.

the general type than appears at first sight in an examination of the adult. The existing species of Pinnipedia show some gradational forms between the most aquatic species, and those (as the *Otariae*) which more nearly resemble the terrestrial Carnivores, and upon the supposition that the former have been gradually differentiated from the latter, it might be hoped that palaeontology would have revealed some further stages in the series of modifications. At present, however, this expectation has been disappointed. In fact, the fossil remains of seals and seal-like animals as yet known are not numerous or of very great interest, although when those of the Antwerp crags, where they occur more abundantly than elsewhere, have been completely described (a work upon which M. Van Beneden is at present engaged) we may look for further information about them. At present we know of fragments of skulls, jaws, and principally isolated teeth assigned to Pinnipeds, from various Miocene and Pliocene deposits in France, South Germany, Italy, and Bessarabia. The genus *Pristiphoca*, was founded by Gervais on a jaw found in the Pliocene marine sands of Montpellier; it belongs to a form apparently allied to *Stenorhynchus* and *Pelagius*. The Miocene species from Aquitaine, known only by isolated teeth, are referred by Delfortrie to the genus *Otaria*. Tusks of animals of great size, and apparently allied to the walrus, have been found in the Antwerp and Suffolk crags, and received the name of *Trichechodon*, and a lower jaw of much interest, as showing a transitional character between the walrus and the more typical seals, also from Antwerp, has been described under the name of *Alachtherium*.

The fissiped carnivora are distinguished from the seals by their limbs being adapted to terrestrial progression, and by their dentition. The latter is best exemplified by that of the dog, which is one of the most average or generalised forms of the order. Its dental formula is $i \frac{3}{3} c \frac{1}{1} \phi \frac{4}{4} m \frac{2}{3} = 42$, thus only wanting the last upper molar to complete the full typical mammalian dentition. The premolar and molar series are much differentiated from each other in characters, and one tooth above and below is distinguished from all the others by its superior size and special attributes, and hence called in descriptive odontology the "sectorial" or "carnassial" tooth. Though the upper and lower "sectorial" have some adaptive similarity, and work against each other like the blades of shears, they are not the homologous teeth, the upper one being the fourth premolar and the lower one the first true molar. The former consists essentially of a more or less compressed blade, consisting of three cusps, and supported on two roots, and an inner lobe supported on a distinct root. The anterior lobe of the blade is very small, the middle one conical, high, and pointed, and the posterior has a compressed, straight, knife-like edge. The lower sectorial has two roots, supporting a crown, consisting, when fully developed of a compressed bilobed blade, a heel, and an inner tubercle. Great modifications in the characters of these teeth occur in the different genera of the sub-order, recent and extinct, but their essential similarity can be traced in all, though sometimes so disguised as to be recognised with difficulty. The teeth in front of sectorials in both jaws are compressed and pointed, those behind them broad and tuberculated.

The existing genus *Canis*, comprising the animals commonly known as dogs, wolves, jackals, and foxes, may be considered as truly cosmopolitan, being distributed on the American continent from Greenland to Patagonia, and throughout the Old World, and even Australia has its wild dog, though this may belong to a feral race, introduced originally by man. True dogs have also been found in a fossil state in Europe and North America, throughout the Pleistocene, Pliocene, and even Miocene periods. Many of these are only known by fragments and

isolated teeth. In the early Miocene a very interesting form occurs, named *Amphicyon*, characterised by the greater development of the tubercular molars, which are not only larger relatively than in modern dogs, but the one missing in them is present, making the typical number complete. In addition to this generalisation in the dental characters, they possessed five toes on each foot, whereas the modern dogs have lost the hallux. They were large heavy-limbed animals, and have been supposed to present affinities to the bears, which, however, they only do inasmuch as they are more generalised carnivora than are the typical dogs. Remains have been found in various Miocene deposits in France, Germany, Italy, and some assigned to the same genus in North America. It is doubtful if the cynoid or dog-like type of carnivore was distinctly recognisable in the Eocene period, for the *Canis parisiensis* of the Paris gypsums was founded on a single tooth.

From the dogs, which hold a very central position in the order, the other existing members deviate in two different directions, one extending through the weasels and martens to the otters and bears, which make the nearest approach to the seals, and the other through the civets and hyænas to the cats, the most highly specialised and characteristic carnivores. The true bears are especially distinguished by the great development of the tubercular and the suppression of the sectorial portion of the molar series. The peculiar dentition of a bear is, for a carnivorous animal, highly specialised, and, as might be expected, appears to be a comparative recent introduction upon the earth, not extending beyond the Pliocene epoch, though several transitional forms occur, as *Arctotherium bonariensis* of South America, and *Hyænartos sivalensis* of the Siwalik Mountain, and *H. insignis* of the Pliocene of Montpellier. Otters have been traced back to the Pliocene in France, and an allied form *Potamotherium*, to the Miocene. *Enhydriodon* is a large otter-like animal from the Siwalik Hills, with very broad and tuberculated molars. The evidence as to the ancient history of the *Mustelidae* is not very satisfactory, as isolated teeth, by which many of the fossil forms are known, are not sufficient indications as to their general characters.

True *Viverridae* are met with in the European Miocenes, one genus, *Ictitherium*, forming a transition to the Hyænas. The latter first appeared in the Upper Miocenes of Europe in forms intermediate between the extremes of existing species, and continued abundant until the close of the Pleistocene, but are now restricted to Africa and Asia. The species so common in the British caves appears to have been identical with the Spotted Hyæna (*H. crocata*) of Africa, and the Striped Hyæna (*H. striata*), has been found fossil in France. The genus has not been met with in America.

The *Felidae* present the most complete adaptive modification of the carnivorous type for a predatory existence. The jaws are short and wide, the incisors very small, the canines powerful, and the molar series shortened, and its sectorial element developed almost to the complete suppression of the tubercular portion. The limbs and claws have undergone corresponding specialisations. The family has now a very wide distribution, and has existed both in Europe and America since the Miocene period. It acquired one most remarkable modification in the animals known as *Machærodus* and *Drepanodon*, in which the upper canine was developed to an extraordinary degree, projecting down from out of the mouth like huge sabre-like tusks. In other respects the animal was constructed much on the ordinary feline type. They were widely distributed both in time and space, being found in North and South America, in Europe (including Britain), and in India, and ranging from Miocene to Pleistocene epochs, when they became quite extinct.

(To be continued.)

UNIVERSITY COLLEGE, BRISTOL

THIS college is now being incorporated under the Board of Trade as a company limited by guarantee, under the Companies' Acts, 1862 and 1867. The Board of Governors is the supreme governing body, and comprises all contributors above 5*l.*, and a large number of honorary members, with various qualifications, resident in various parts of the West of England. The Council is the managing body, consisting of sixteen, one-half of whom are elected by the governors (in the first instance by the contributors of money, about 20,000*l.* having been already promised in Bristol alone), and the other half are nominated by the Vice-Chancellors of the Universities of Oxford, Cambridge, and London, by the two contributing Oxford Colleges, by the Lord-President of the Privy Council, by the faculty of the old-established Bristol Medical School, and by the Principal and professors of the College.

The Council comprises the following names :—

Elected by the Contributors.—W. P. Baker, merchant; F. N. Budd, barrister; Rev. J. W. Caldicott, Head Master, Grammar School; Lewis Fry, School Board Chairman, solicitor; Rev. F. W. Gotch, Principal, Baptist College; Rev. J. Percival, Head Master, Clifton College; G. F. Schacht, pharmacist; W. Smith, merchant.

Prof. B. Jowett, nominated by Vice-Chancellor of Oxford; Prof. Stuart, nominated by Vice-Chancellor of Cambridge; W. L. Carpenter, nominated by Vice-Chancellor of London; Prof. Henry Smith, nominated by Balliol College; Rev. H. B. George, nominated by New College; R. W. Coe, nominated by Bristol Medical School.

At their preliminary meeting, held recently, the Council decided to commence operations in October next, and to appoint at first a Professor of Chemistry and a Professor of Modern History and Literature.

A piece of land has already been secured, but, for the first session or more, the lectures will be given in temporary premises. In all except the strictly medical classes of the medical school (which is being affiliated with the New College), the instruction will be open to young people of both sexes. Other courses of occasional lectures will be organised during the session.

In addition to the aid afforded by Balliol and New Colleges, Oxford, the Worshipful Company of Cloth-workers in London have spontaneously offered a very handsome subvention to the College, with the view of establishing a department of Textile Industries for the improvement of the technical education of the West of England cloth manufacturing districts, as Stroud, Trowbridge, &c. It is believed that special attention will be given to the chemistry of dyeing and wool scouring, as well as to the mechanical part of the manufacture. The details of the arrangements are under the consideration of the Council and of a committee of cloth manufacturers and others, by whom very great interest is felt in the proposed scheme.

The registered temporary office of the College is Shannon Court, Bristol, and letters sent to the Secretary of University College, Bristol, at that address, will be attended to.

The Council are seeking for a permanent secretary, and offer a salary of 200*l.* per year. They hope to obtain the services of a gentleman who will throw himself with zeal and interest into the establishment of the College.

THE USE OF YELLOW GLASS FOR ZOOLOGICAL COLLECTIONS

AT a recent meeting of the Entomological Society of Belgium, M. Capronnier read a paper giving an account of some experiments which he had made bearing on the question as to how public collections of insects