A CASE OF BOTTLE IN THE RECTUM SUCCESSFULLY REMOVED.

By L. A. RODENSTEIN, M.D., of New York.

CHARLES W., a coachman, had for a long time suffered with hemorrhoids. A friend and fellow sufferer, as a last resort, recommended dilatation of the sphincter ani by the introduction of a bottle into the rectum. He obtained a six-ounce medicine bottle, broke off the neck, ground off the rough edges, and on the fourth of July, 1878, holding the bottle firmly by its bottom, succeeded in introducing its conical end fairly into the rectum. He was just congratulating himself that at last he had hit upon a sure relief, when, to his horror, the bottle slipped from his hand and disappeared in the gut. The distention of the bowel had created a vacuum which drew the bottle into the gut. He had introduced the bottle at 7 A.M., and had mowed grass all day. At 7 P.M. I saw him; he had already taken a dose of castor oil to bring on an evacuation in hopes of ridding himself of the bottle, but without success. I introduced my index finger into the rectum, and touched what seemed the bottom of a good-sized bottle. I insinuated one finger after another until I had introduced the whole hand. Vain efforts to grasp it and make traction caused it to ascend further up the rectum. The pressure upon my hand now became so great that it lost all sense of touch. I persevered, however, using first one hand then the other, but only to find that the bottle was being carried farther up, till it had become engaged in the sigmoid flexure, where it remained.

Four hours having been spent in these ineffectual attempts, two other practitioners were summoned to assist me. At first they repeated my efforts, but likewise without success. The patient was then chloroformed. Upon then introducing my hand into the relaxed bowel, I found that the bottle had passed along the descending colon, having overcome the constriction of the sigmoid flexure and had followed the transverse colon until it had become fixed in the right iliac fossa at the cæcal pouch. As for extracting it, it seemed out of the question save by operative interference. On external manipulation, to find the precise location of the bottle, I had no difficulty in locating it, and found the neck of it in the right iliac fossa near the cæcum. The idea was suggested that, as it had been pushed by my hand to its present position, it could also be pushed back by pressure from the outside. The patient was put on his left side, his knees being well drawn up to relax the abdominal muscles; one of my colleagues inserted his arm up to the elbow into the rectum to guide the bottle, and found it was at that moment lying lengthways in the transverse colon, which I also could plainly feel through the abdominal walls. I pushed and manipulated with all the force I dared use, my assistant, meanwhile, guiding with his inserted hand. We made rapid progress until we reached the sigmoid flexure, when we came to a standstill. It seemed at that moment as if we were again to fail, but I kept up a constant and strong pressure, aided by the patient, who had come out from the influence of chloroform and bore down constantly. By lying partly on the bed facing the patient, my fist pressing upon the opening of the bottle, my elbow resting upon my hip, and my feet braced against the wall, I was enabled to use all my strength; the obstruction finally yielded, and the bottle, or the patient, was soon safely delivered. There was resistance at the sphincter ani, but it was soon overcome.

The bottle was partly filled with liquid fæces; it proved to be an ordinary six-ounce bottle of the apothecaries', with its neck broken off, making a cylinder four and one-half inches long, and two and an eighth inches in diameter.

The following points are worthy of note in connection with this case:

1. The rapid distention of the bowel when the conical body was introduced.
2. The severity of the pressure upon the hand and arm when in the bowel, both by the sphincters and muscular coat of the intestine, paralyzing the hand and destroying the nicety of the sense of touch.
3. The folly of anesthetizing the patient in the hope of rapidly grasping and extracting the introduced body, as in this case the bottle was thereby drawn further up into the bowel. But for the anæsthetic the bottle would not have passed the sigmoid flexure.
4. The value of the patient's efforts in bearing down in accomplishing the final delivery.

I might mention here that we made many attempts both to grasp the bottom of the bottle by forceps and also to engage its opening and draw it down by means of hooks of different sizes and shapes, but they were useless.

I append a few of the most noted cases of foreign bodies in the rectum.

Dr. Weigand, of Würtemberg, relates a case of a farmer who introduced a cylindrical piece of wood (the end of a bean pole) five inches long high up in the rectum; was treated by castor oil, and the wood was expelled after thirty-one days.

Dr. Dahlenkamp, of Heidelberg, reports the case of a man, sixty-five years old, who, when in the woods, was compelled to stool; while in a crouching position his foot slipped and he fell. He felt a sharp pain in the anus and also in the rectum, from that time had difficulty in defecation, and only rested by lying on his belly, and not until ten years afterward was a piece of oak with the bark still on, four and a half inches long, removed.

Dr. Tompsett removed, by means of a long polypus forceps, a match-box six inches in circumference and two and a quarter inches in length. Desault's case of a man æt. 47, who entered the Hotel Dieu to have a crockery vessel extracted from his rectum. This vessel was a preserve jar, the handle of which was broken and the bottom detached. It was conical in shape, two inches in diameter and three inches long.

1838. Cumano extracted from the hollow of the sacrum a two-inch bottle by means of forceps.

1848. Parker reports a unique case of a man æt. 60, who, in a house of prostitution, forced a goblet two inches and a half in diameter and three inches and a half long into the vagina of his partner. She, for revenge, when he was completely intoxicated, pushed the bottom of the goblet into his rectum until the entire goblet had disappeared. It was removed by breaking it and taking it away by piecemeal.

1878. A person æt. 40, introduced a wooden pepper-box, one and a quarter inches long and one inch wide, in his rectum; had done so for twenty years; at last had to be removed by forceps.

1835. A young man contemplating suicide introduced a fork in his rectum; violent pain which he had suffered made him repent and obtain aid at the Hotel Dieu.

In the history of the American war a sailor, who introduced into the rectum a stone five and a quarter inches long and three wide, was relieved successfully by gastrotomy.

1878. Studsgaard related the case of a postman who, in order to check an annoying diarrhea, introduced into the rectum a mushroom bottle, neck uppermost; he was anesthetized with chloroform, but the bottle which, previous to the narcosis, had been felt in the rectum, slipped further up; the bottle could be felt through the abdominal walls along the median line on the left side, the bottom being near the horizontal ramus of the pubis; laparo-enterotomy, through the median line, was successfully performed. The bottle was seventeen centimeters long and five in diameter.

1853. Mr. Sacy removed from the rectum of a lady, piece-meal, a mass fifteen inches in circumference, consisting of concentric layers of a compound of earthy and ferruginous matter, with many thousand strawberry seeds.

The late Professor Charles Budd presented a specimen at the New York Obstetrical Society—a mass of fecal accumulation, over fifteen inches in circumference, which he extracted from the rectum of a lady; she had suffered for months, and had been treated for chronic diarrhea. The mass had a hole in the middle, through which a continuous liquid discharge was passing. The obstruction was removed in two parts by means of the short obstetrical forceps.

Nolet relates the case of a monk who, in order to relieve himself of a violent colic, introduced into his rectum a bottle of Hungarian wine, having previously made a hole in the cork to admit the wine into the intestine. It slipped out of his fingers, and a small boy was found to introduce his hand; he reached the bottle and drew it out.

1813. Tuffell removed a flask of crystal from the rectum of a patient, but was obliged to break it in removal.

1777. Buzzani extracted from the rectum of a man a teacup; it had to be broken.

Morand removed, with a pair of lithotomy forceps, from the rectum of a man sixty years old, a large knitting-sheath of boxwood, six inches long.

M. Bonhomme extracted from a weaver, who had long suffered from constipation, a shuttle with its roll of yarn.

Marchetti mentions the often told story of the students of Göttingen, who introduced into the rectum of an unfortunate woman all excepting the small end of a pig's tail, from which they had cut enough of the bristles to render it as rough as possible; it was successfully removed by pushing a hollow reed over the pig's tail, thereby protecting the anus and removing the offending cause easily.

Constance relates the case of a man who fell on an inverted blacking pot, forcing it up his rectum. The pot was removed in pieces after breaking it.

Mr. Thomas relates the case of a gentleman who, by the advice of a physician while in Paris, introduced a flexible cane, about the thickness of a finger, daily into his rectum for the purpose of overcoming obstinate constipation. This plan worked well, and excited a stool regularly, until one morning, being in great haste, he carelessly forced it up farther than usual, when it was suddenly sucked out of his hand up into his body beyond the reach of his fingers. Severe pain set in, an examination was made, and the upper end of the stick was plainly felt through the parietes of the abdomen midway between the ilium and the umbilicus on the left side; this end had evidently passed through the sigmoid flexure and entered the tract of the transverse colon. This case was treated by cathartics until the lower end could be reached by the hand and extracted; its length was nine and a half inches.—*Annals of Anatomy and Surgery*.

ON FILTH AND SEMI-FILTH DISEASES.

By JOHN C. PETERS, M.D., New York.

I HAVE coined the name semi-filth diseases, in order to cover a large class of disorders which may arise from other causes, but in which filth is only too often a large factor.

The great sources of filth in large cities are dirty streets and gutters; the large quantity of filth which is washed down into the receiving basins and sewers with every rain storm, and the fouling of dock grounds and water by the contents of the sewers. There is every reason to believe that more filth in the shape of garbage and slops gets into the sewers from filthy streets and gutters than from water closets and kitchen sinks, and that a very large proportion of sewer gas is thus caused by filthy streets and gutters. Next in order is the vile odor from outdoor privies, many of which are without any ventilation, having neither windows nor chimneys. The health authorities are only too often remiss in their attention to these nuisances. London has one water closet for every five inhabitants. It is not at all uncommon to find water closets, even in otherwise good houses, without windows or other means of ventilation except by the door only, which must of course be kept closed when in use. Dirty cellars and foul air streaming up from the gutters into the air boxes of almost all houses, are other sources of household sickness. The stables of great cities are only too often in a filthy condition, and in this they are very rarely inspected by the health authorities. The smokes and smells from gas and ammonia works, from offal-rendering establishments, and the making of fertilizers, are pregnant sources of discomfort and disease. It is, perhaps, not commonly known that the fertilizer-making establishments, which cause so many mal-odors in this city, use ground bones, blood, all the offal and scrap, and the contents of the bowels of slaughtered cattle. These are first boiled, then dried, and much foul gas from them is not consumed but escapes from the chimneys, and are generally attributed to Hunter's Point.

Foul air must first attack the throat, air passages, and lungs. Diphtheria has often been traced to sewer gas, but much more commonly arises from foul streets, gutters, drains, receiving basins, etc.

Although it and membranous croup are often apparently excited by cold, yet they more commonly arise from cold taken in foul air, and must be regarded as partial or semi-filth diseases. In 1880 72 deaths occurred from diphtheria in January; 77 in February; 65 in March; 81 in April; 76 in May; 61 in June; 89 in July; 97 in August; 125 in September; 199 in October; 234 in November; 214 in December. So that they have some other factor besides cold, and that probably is filth.

Consumption is generally regarded as a chronic catarrhal pneumonia, most often caused by cold and insufficient clothing; but in 1880 there were 402 deaths in January; 375 in February; 412 in March; 394 in April; 365 in May; 351 in June; 385 in July; 380 in August; 376 in September; 408 in October; 339 in November; 450 in December. The deaths are so evenly distributed through every month in the year, that there must be some other cause than exposure to cold, and that cause is probably the inhalation of foul air. Bowditch gained great credit for apparently proving that consumption arose from moist ground; but foul moist ground is probably a greater factor, and the inhalation of foul dust and dirt is not far behind it in deleterious effects.

Pneumonia, also, is generally attributed to exposure to cold and wet; but in 1880, 261 deaths occurred in January; 248 in February; 266 in March; 375 in April; and 340 in May. So that it also has another factor than mere cold, and that doubtless is the inhalation of foul air. It is true that only 163 deaths occurred in June; 127 in July; 108 in August; 134 in September; but in those months the city is largely depopulated; 205 deaths are recorded for October; 266 for November; and 349 for December.

From bronchitis 106 deaths are recorded in January; 129 in February; 140 in March; 138 in April; 131 in May; and 102 in June, so that bronchitis has other causes than taking cold, and foul air bronchitis and pneumonia are well known diseases.

Typhoid fever is generally accepted as a filth disease; typhus fever arises from the over-crowding of filthy people, and is at least a semi-filth disease. Cholera is a well known filth disease, and cholera infantum arises as much from foul hot air as it does from spoiled food or mistakes in diet, and is at the very least a semi-filth disease. Yellow fever is now generally admitted to be a filth disease, prevalent only in dirty cities and places, and all malarious diseases are necessarily foul air or filth diseases.

Civic malarious diseases, arising from the combined influence of foul ground and subsoil, foul streets, gutters, drains, receiving basins, cellars, back yards and privies, and other baneful influences, are certainly filth diseases. Pure, fresh air and free ventilation are necessary in the treatment of all diseases, and foul air increases the malignancy and mortality of all infectious and contagious diseases, including smallpox, measles, scarlet fever, diphtheria, whooping cough, typhus and typhoid fever, and many others.

These positions are so true as to be regarded as axiomatic by all except exceedingly old-fashioned medical men or obstinate officials. Let the Street Cleaning Department give us clean streets, gutters, and receiving basins, and the Board of Health give us wholesome outdoor privies, clean stables, control noxious trades far better than it does, and abate the loathsome smokes and smells which abound here, and then the death and sick rate will rapidly fall. The unhealthy condition of the city may be very equally charged upon the negligence of both these departments.

Puerperal diseases are attributed to other causes besides taking cold, yet we find 40 deaths recorded in January, 1880; 32 in February; 37 in March; 49 in April; 42 in May; 24 in July; 24 in August; 37 in September; 24 in October; 20 in November; and 45 in December.

The acclimatization to filth is a curious problem. Some people become accustomed to it, and thrive as well upon it as others do on tobacco and whisky; but 3,469 children died of diarrheal disease in 1880, and no less than 14,690 children died under five years of age. The great majority of these lived not only in poverty, but in filth. The deaths of children in filthy cities reaches enormous proportions, and those who survive may thrive like rose bushes and potato plants in manure heaps.—*Medical Record*.

CHRONIC TOBACCO INEBRIETY.

By DR. A. B. ARNOLD, M.D., of Baltimore, Prof. of Clinical Diseases of the Nervous System.

THERE exists considerable diversity of opinion respecting the effects of the habitual use of tobacco. Exact observations upon this point are still wanting. Those who deprecate even the most moderate indulgence in the weed seem to be influenced by the fact that nicotine is one of the most virulent of vegetable poisons; while others doubt the occurrence of a morbid condition resulting from this practice, because it is not readily recognizable in ordinary cases of smoking, chewing, and snuffing. Although it must be admitted that in the great majority of instances these modes of using tobacco are but seldom followed by serious impairment of health, it is, on the other hand, undeniable that certain well marked symptoms arise from continued consumption of small doses, that deserve to be designated as cases of chronic tobacco poisoning. A brief account of the results obtained by poisoning animals with nicotine, and by watching persons under the influence of dangerous doses of tobacco, will show more definitely the morbid tendencies of this noxious agent. At first there is a short stage of excitement, which is soon succeeded by a deep depression of the nervous system, characterized sometimes by clonic and tonic spasms. This is followed by extreme relaxation of the voluntary muscles, abolition of reflex action and of electric excitability, stupor, insensibility, contraction, and finally dilatation of the pupils. The respiration is shallow, and a thoracic constriction is felt. Failure of the heart's action, preceded by a short period of cardiac excitement, supervenes, and also gripping or crampy pain of the bowels, frequently follow by bloody stools. These symptoms indicate serious implication of the centers of respiration and circulation, leading to paralysis, the immediate cause of death being asphyxia. The novice, when indulging in his first cigar, suffers from the effects of nicotine in a moderate degree, but in no less decided a manner; indeed, he closely presents the picture of seasickness. Nausea, giddiness, and a sensation of tightness across the chest which soon amounts to dyspnea, and a kind of pain resembling angina pectoris are the first symptoms. Then ensue extreme pallor of the face, a cold sweat on the forehead, flickering before the eyes, singing in the ears, slight tremors, headache, colicky pains, labored respiration, a small, rapid, irregular pulse, somnolence, faintness, and a feeling of general misery, or of impending dissolution. A copious flow of saliva, vomiting, and frequently free evacuations from the bowels soon give relief. The tolerance of repeated and increasing quantities of tobacco which is rapidly established is an interesting phenomenon, and explains the apparent immunity from its effects. Traube experimented with an injection containing one twenty-fourth of a drop of nicotine, and four days afterward it required a whole drop to produce effects similar to those of the first dose. One of the most marked symptoms in these experiments was increased muscular excitability, which on larger doses developed tetanic contraction and muscular tremor. It is impossible to study the effects of nicotine upon the sensorium in animals, but there cannot be a doubt that tobacco exerts a direct influence upon the hemispheres. This is evidenced by the calming or soothing effects which small quantities produce upon the mind; and the occurrence of a species of inebriety that may terminate in stupor and insensibility when excessive quantities are used. The vertigo and want of co-ordination of the voluntary muscles must be referred to disturbance of the central ganglia. The implication of the spinal cord is shown by the tremor and tonic spasms; and the interference with the respiration and circulation proceeds from the abnormal condition of the medulla oblongata. Claude Bernard has shown that the motor nerves completely lose their electric excitability when large doses of nicotine are given.

According to Vulpian and Jullens, the striped muscles do not appear to be affected, for when their nerves were cut during the stage of paralysis from nicotine, it was still possible to evoke muscular contraction by mechanical stimulants. The unstriped muscles evince even a greater susceptibility to the influence of tobacco than the striped. It is highly probable that the asthmatic symptoms result from spasmodic constriction of the small bronchial tubes; and it is quite certain that the vomiting, the enteralgia, the augmented peristaltic action of the bowels, and occasionally the frequent micturition and uterine colic are due to an increased arterial tension, which has been experimentally demonstrated.

It thus appears that the sympathetic ganglia are likewise influenced by the use of tobacco. Robin ascribes the fatal result from nicotine poisoning to the inability of the blood to absorb oxygen, but this can hardly be the correct explanation, for artificial respiration sometimes succeeds in averting death; and furthermore the convulsions and the paralytic condition of the respiratory muscles permit a sufficient interchange of gases. The action of the heart is eminently influenced by the toxic effect of nicotine, and has for this reason attracted much attention. In very small doses it causes a remarkable slowness of the cardiac impulse, which may cease altogether during the diastole. After a short time, when large and sometimes even small doses are used, an increase in the force and frequency of cardiac contractions takes place. This is succeeded by a gradual weakness, retardation and irregularity of the pulsations until they cease entirely; but the heart continues to beat for five or six minutes after the respiration has stopped. Recent pathological experiments have led to the conclusion that the heart symptoms in nicotine poisoning are due to the disturbed inhibitory function of the vagus nerve, and an abnormal state of the musculo-motor ganglia of the heart. Some of the secretions are undoubtedly augmented under the influence of nicotine. This is observable in the increased flow of saliva, the more copious discharge of bronchial mucus, and the freer transpiration from the skin. It is next of importance to consider whether the symptoms characteristic of acute nicotine poisoning are manifested, though in a far more moderate degree, in the habitual use of tobacco in any of its forms, or from the inhalation of the dust to which workmen in tobacco establishments are exposed. From all accounts it appears that smoking is the readiest way of absorbing the largest amount of nicotine, especially if the smoke be inhaled, as is the fashion among those who use cigarettes. Chewing is not a very obnoxious mode of indulging in tobacco, for the nicotine is readily dissolved in the saliva, and thus the greater part of it is thrown out with the spittle. According to general experience, it seems that the habit of snuffing is the least injurious mode of using tobacco. The continued irritation of the nasal mucous membrane appears to cause changes in its structure which, in the course of time, prevents the entrance of nicotine into the system. Nor are there any reliable observations which would confirm the belief in the resulting noxious effects of tobacco inhalation in the preparation of its various fabrics. There certainly exists a unanimity of opinion among observers, that the prolonged and large consumption of tobacco by smoking gives rise to unmistakable symptoms of chronic tobacco poisoning.

In a number of such published cases we find particular mention of physical disturbances, characterized by hebetude and incapability for sustained mental activity, or an exhibition of unusual timidity and pusillanimity of conduct. Ophthalmological journals report instances of defects and disturbances of vision which are ascribed to the use of tobacco. Hutchinson, in his hospital reports, gives cases of amblyopia from this source which were accompanied by somnolence, vertigo, and headache. Ophthalmoscopic examination detected paleness of the disk, diminished caliber of the arterial branches, and in advanced cases atrophy of the optic nerve, terminating in complete blindness. Wecker observed restoration of sight in those cases where tobacco smoking was abandoned, and asserts that the cure was assisted by strychnia in the temporal region, and the application of the interrupted current. Raymond ascribes these cases of amblyopia to the combined effects of tobacco and alcoholic stimulants. Hyperæsthesia of the different sensory nerves is very common, and it is well known that tobacco smokers suffer from neuralgia. Motor disturbances of every description have been traced to the immoderate use of tobacco, such as muscular weakness, especially of the lower extremities, tremor, ataxic movements, and cramps in different portions of the muscular apparatus. For the past few years I myself have been much addicted to smoking, which brought in its train a variety of symptoms of a very unpleasant character. In my case, the effects of tobacco were apt to be felt more particularly when lying down to sleep, consisting of the most part in increased action of the heart, throbbing of the temporal arteries, and flushes of heat over the head and face. But the most troublesome symptom, which fortunately made its appearance not quite so often, was a choking sensation of an alarming character, though only of a moment's duration. Probably it was caused by spasm of the glottis. Occasionally I was startled, just when drowsiness came over me, by a sensation as if some one had given me a hard slap upon the side of the head. At longer intervals I suffered in the morning, while yet in bed, from cramps of the calf of the right leg and in the sole of the foot on the same side. Stretching of the limb, I found, favored the occurrence of these local spasms. Distention of the stomach with flatus was another annoying symptom, to which I ascribed the dyspnoea from which I suffered much. It seemed to me that eructations, which I learned to bring on at any time, very frequently prevented the occurrence of some of the symptoms I have mentioned, especially the sudden onset of the choking sensation. Perhaps the latter phenomenon is a reflex action from gastric irritation. My appetite has never suffered, though I discharge quite a quantity of saliva during the act of smoking. The best reason I can assign for my belief that these symptoms were caused by tobacco, is the fact that on abandoning its use I was free from them. Lately I began to smoke cigarettes for the purpose of limiting the quantity of tobacco used; the evil effects of my previous immoderate indulgence are thereby not lessened, which warns me to abandon the habit entirely. The depressing effect of the inordinate use of tobacco upon the generative function is an old observation; indeed, it was considered the best antiprophetic remedy in the Italian convents of a past age. Wright, Clemens, and Fousard recently reported cases of impotency caused by the excessive use of tobacco. The latter authority describes a very annoying species of dyspnoea, generally occurring in the evening, which is not an infrequent effect of smoking. All accounts agree that disturbances of the heart's action is the most common of all symptoms in chronic tobacco poisoning. Richardson affirms that it aggravates the intermit-

tence of the pulse which results from cardiac troubles. Retardation of the pulse under the influence of tobacco is probably due to its depressing effects upon the general nervous system. Angina pectoris may also be counted among the occasional effects of tobacco. Colicky pains, and sometimes violent cramps of the intestines, may be traced to the same cause. The popular belief that use of tobacco leads to dyspepsia does not seem to be well founded; at least in carefully observed cases of chronic tobacco poisoning, indigestion has not been noticed as one of its characteristic features. Chronic laryngitis is mostly observed among cigarette smokers, and it is probably due to the inhalation of the fumes. The question whether the use of the tobacco-pipe may cause cancer of the lips and tongue has been discussed by eminent surgeons. In view of the relative infrequency of this affection, which often locates itself in other parts than the mouth, and further, as persons suffer from cancer of the lips and tongue who never use tobacco, other factors must be presumed to co-operate in the production of the disease, although the existence of fissures and sores on the lips would commend total abstinence. Recent investigations respecting the chemical constituents of tobacco fumes confirm the older view of the presence of nicotine. It has, however, been ascertained that the nicotine appears mostly in the form of salts, having picoline for their base. Other substances of a similar composition are generated in the act of smoking, which seem to form under the influence of the varying quantity of water in the tobacco and its mode of combustion. Thus the use of the pipe develops the highly diffusible and narcotic pyridin, while cigar smoking gives rise to larger quantities of colidin. There exists only one remedy for the cure of chronic tobacco poisoning, but that is so prompt and efficacious that none other is needed. Unfortunately there exists also a very great and frequently an insurmountable prejudice among smokers against its employment. It is the abstinence from tobacco.—*Maryland Medical Journal*.

[Continued from SUPPLEMENT, No. 293, page 4678.]

THE CAT AND ITS RELATIONS.*

By FREDERIC A. LUCAS.

PROBOSCIDIANS.

The same features which excluded the cat from the Cetacea, exclude it also from the Sirenia, and we pass to the Proboscidea. This order contains the elephants, of which there are at present but two species, although formerly many more existed, varying in size from the mammoth, which stood thirteen feet high, to the little elephant, whose remains found at Malta indicated a height of only five and a half feet. Besides the proboscis, so characteristic of this order, and which enables these short-necked, unwieldy animals to feed alike from herb to tree, the proboscidea have a very peculiar dentition. The upper incisors are developed as tusks, and like the corresponding teeth in rodents, grow continuously, while they are destitute of enamel, like the teeth of Edentates. The molars succeed one another to the number of six, but instead of one tooth forming under another and replacing it from below, each molar forms behind its predecessor, and gradually pushes it forward, the front of the tooth in use being as steadily worn away.

HYRAXES.

According to Tennyson, King Arthur said:

"The older order changeth, giving place to new,"

and the animals which constitute the order of *Hyracidae* are good illustrations of this fact. Once the hyraxes were classed with the rodents; next, although no larger than a rabbit, they were placed after the rhinoceros, and finally they were given an order by themselves. It may seem strange that they should have been so changed about, but part of the trouble, like many another, arose from trusting too much to appearances. From its small size and gregarious habits, and from the fact that its upper cutting teeth grow like those of rodents, it was put in that order. More careful investigation showed that its feet were armed with hoofs, not claws, and that its teeth and skeleton were far more like those of a rhinoceros than a rabbit, so it was shifted to the ungulates, and finally, on account of its peculiarities, set apart by itself. The hyrax has in some respects more backbone than any other mammals, for it has twenty-two rib-bearing vertebrae and eight lumbar, a greater total number than is found in the sloths. The hyrax was known to the Jews, and the passage in the Bible which says, "The conies are but a feeble folk, yet make their houses in the rocks," refers to it.

HOOFED ANIMALS.

The great order of *Ungulata*, or hoofed animals, includes nearly all the large quadrupeds, and those most useful to man. Its members range in size from the hippopotamus to the tiny musk deer, no larger than a kitten. Among the noticeable forms are the rhinoceros, tapir, hog, horse, ox, deer, and giraffe. This order is characterized by the absence of a collar bone, by the presence of hoofs, and by grinding teeth of great complexity, formed of plates, or folds of enamel embedded in dentine, and with the crown of the tooth never wholly covered with enamel. The canine teeth are usually absent, and there are never more than four complete toes on a foot. By the simple teeth completely cased in enamel, by the large canines—although this is not a certain distinction—by the presence of claws and of five fingers on the forefoot, the cat is separated from the ungulates.

CARNIVORES.

Our last order but one is that of *Carnivora*, or beasts of prey. In them the collar bone is usually lacking, or, if present, is very small, the canines are large, and the crowns of the molars completely covered with enamel. The trunk vertebrae are almost invariably twenty in number, and the toes—never less than four—are armed with claws. Here evidently we have an order with which the cat agrees perfectly, and we decide that the cat belongs to the order of carnivora.

THE CAT A CARNIVOROUS MAMMAL.

Let us suppose now that we are going to construct an animal for a predatory life. We will make the skull small, so that it may not render the animal top-heavy. As our animal is to live upon other beasts, it will need sharp-edged teeth, and we will plant them in rather a short jaw, so that the muscles may have great power by acting on a short lever—the jaw being a lever of the third order. As we shall need powerful muscles to work the jaw, we must widen the cheek bone to give them room, and as the jaw will be exposed to severe strains by the struggle of the

prey to escape, we shall so articulate it that it shall run but little risk of being dislocated. As our ideal animal may wish to carry its food to some secure place where it may feed in safety, we will give it very strong neck muscles to enable to raise and carry off its prey, and to furnish attachments for these, we shall have to roughen the base of the skull, and put long processes on the first dorsal vertebrae. The animal will need great freedom of movement in the fore limbs, so as to strike rapid blows, but at the same time we need power, and so we add sharp ridges, to which the muscles can fasten. Our animal must be able to spring suddenly on the creatures it lives upon, so we make the heelbone long, to give leverage, and put long processes on the lumbar vertebrae, to which we secure the leaping muscles. Then we will arch the foot bones, because sometimes the creature we are constructing may miss his leap, and we do not wish the shock of a fall to injure it. Finally, it ought to have pretty sharp claws, and that they may not bear on the ground, we will make them draw back when not in use. We have, we think, constructed a pretty good carnivorous mammal; and at the head of the order carnivora we find a family—the *Felidae*—possessing all these characters. The cat, too, that we have been studying has them also; hence there can be no doubt but what it is of the genus *Felis*. We need but a name to denote just what, *felis* our cat is, and, as we find that the cat has been domesticated since the earliest days, we call it *Felis domestica*, and thus complete its classification.

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