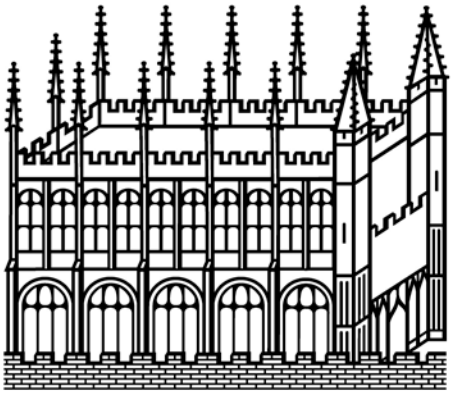

AN ESSAY

ON THE

THERAPEUTICAL EFFECT

OF

PURGATIVES ON THE HORSE,

READ BEFORE THE

Veterinary Medical Association of London,

SESSION 1855–56,

TO WHICH WAS AWARDED THE SOCIETY'S SILVER MEDAL.

BY

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INTRODUCTION.

THE commencement of the medical profession, whether regarded as an art or science, or both, is lost in the darkness of the early ages. The fabulous history of the ancients derives it from the gods. The most ancient physicians we read of were those who embalmed the patriarch Jacob, by order of his son Joseph.* From their being styled "servants of Joseph," we infer they were not priests, as the first physicians are erroneously supposed to have been. The Egyptian priests of that age were held in great veneration, so that when through a public calamity† the people became slaves to the prince, the priests are distinctly mentioned as retaining their liberty.‡ The Jewish physicians, also, were absolutely distinct from the priests, although, like some of our country clergy, these might have known and administered many common remedies. Indeed, it would seem that the influence of the physician was hostile to a popular recognition of the Divine government, for it is stated as an offence in King Asa, that, when diseased in his feet, "he sought not

* "And Joseph commanded his servants the physicians to embalm his father: and the physicians embalmed Israel."— *Gen.* l. 2.

† The seven years' famine in Egypt.

‡ "Only the land of the priests bought he not; for the priests (or princes) had a portion assigned them of Pharaoh, and did eat their portion which Pharoah gave them: wherefore they sold not their lands."— *Gen.* xlvii. 22.

to the Lord, but to the physicians."* The investigation of the healing properties of herbs, and their use as means provided by the Deity for mitigating or removing sickness and disease, to be employed in dependence upon His blessing, was not then a common study; and the popular reverence for the physician became almost idolatrous. In that general degeneracy of the nations, Religion and Medicine were confusedly mingled; of which we have evidence in modern barbarians, among whom the priest, or conjuror, is the only physician.

The ancient Egyptians attributed the invention of Medicine to Thoth, the Hermes or Mercury of the Greeks. According to Origen, this great nation, so famous for its wisdom, held the belief that thirty-six demons, or gods of the air, divided the human body among them; that each had his distinctive part and name, and that by invocation to these several gods, according to the parts affected, the suppliant was cured.

Those who succeeded Thoth, made use of *venesection*, *cathartics*, *emetics*, and *glysters*, but there is no proof that he established the practice: on the contrary, the Egyptians assert that the first idea of these remedies resulted from observations on brute animals. For instance, *venesection* was learned from the hippopotamus, which is said to perform that operation upon himself: on these occasions, he comes out of the river and strikes his leg against a sharp-pointed reed, taking care to direct the stroke against the vein, and producing a considerable effusion of blood, which he stops, after bleeding, by filling the orifice with mud. The idea of *glysters* is said to have been caught from a habit of the ibis, a bird worshipped by the Egyptians under the designation of Tautatum, which is said to give itself glysters with its bill.

The Greeks have attributed the invention of physic to Pro-

* 2 Chron. xvi. 12.

metheus, Apollo, and Æsculapius, which last was the most celebrated among that people, and, after his death, was deified: but their practice may be most correctly denominated surgery, or the cure of wounds; hence Æsculapius, and his pupils Chiron, Machaon, and Podalirius, are celebrated for their skill in curing wounds. Warriors also obtained a similar renown: for example,—Theseus, Telamon, Jasin, Pellus, and his son Achilles, were taught the art by the centaur Chiron; and Achilles is said to have discovered the use of verdigris in cleansing foul ulcers. The treatment of the Greeks was, however, almost exclusively confined to external fomentations and the use of wine internally.

Hippocrates, the father of Medicine, and the seventeenth lineal descendant of Æsculapius, was the first who treated of Medicine in a rational way. He lived B.C. 400, and is the most ancient author whose works are still extant. After him came Eristratus, to whom we are indebted for the first regular indication of the pulse.

About this time commenced the division of the science of Medicine into three branches, viz.:—dietetic, pharmaceutic, and chirurgic; or, those who pretended to cure by regimen only, those who employed drugs, and those who practised surgery.

Soon after this lived Celsus, who is denominated the Latin Hippocrates: this learned man wrote a work on Medicine, still celebrated for the purity of its Latin, and forming part of the examination at Apothecaries' Hall at the present day.

In the year 131 B. C. appeared the renowned Galen, whose name will be ever remembered in the annals of physic.

From that period until the 16th century, the history of Medicine furnishes but few noticeable incidents or names; but in that century, amid the general revival of the arts and sciences,

and the impatient thirst for new discovery which distinguished that age, Harvey contributed an important element, in the discovery of the Circulation of the Blood *, whereby the entire science received a new impulse, which has been increasing in force ever since, multiplying in progress, and spreading its influence in many forms,—a progress and an influence in which I earnestly trust the Veterinary Art will continue to share.

* Some have claimed for Ruini, an Italian, and others for Paul of Verona, the credit of this discovery ; but the balance of testimony has decided in favour of the illustrious Englishman.

THERAPEUTICAL EFFECT

OF

MEDICINES.

In administering medicines, various circumstances must be taken into consideration. For instance, the state of aggregation, as it will sometimes modify their effect; thus, morphia is more active in solution than in the solid state: and again, chemical combination, for two substances being mixed will sometimes form inert compounds; and further, organic peculiarities, the properties of grasses being considerably modified by the nature of the soil in which they are grown, and the manner of cultivation, age, and climate. The quantity to be administered must be determined on a just consideration of the age, size, race, sex, and temperament; mode of life is also an important element, especially as affecting the human subject,—it must not be overlooked by the veterinary practitioner. The repetition of medicines also interferes with their effects, as in the use of opium,—a woman, named Galvini, took more than two hundredweight in a period of thirty-four years. Diseased conditions of the body will materially diminish or augment the effect of medicines; opium is administered in cases of tetanus, but with diminishing effect. The nature of a part to which a medicine is applied will have an important bearing on the result; as, for example, the stomach is much more susceptible than the skin:

hence, carbonic acid, which acts as a positive poison when taken into the lungs, is but a gentle stimulant when taken into the stomach.

Medicines may also be applied to the skin; this is called the iatraleptic method: rhubarb has been dissolved in water and rubbed into the skin, but its effects applied in this manner are very uncertain.

Another form of application is by injections. These are administered in fluid or solid forms; in the fluid, under the name of clysters or enemas, they are thrown up into the rectum; * in the solid form they are placed in the rectum, and are then called suppositories, from *suppono*, to place under.

Cathartics may be defined as medicines which quicken or increase alvine evacuations; they produce their effect in various ways. Some act by merely exciting the muscular fibres of the intestines to increased peristaltic motion, and thus cause their contents to be more quickly and more completely evacuated; some stimulate the mucous follicles and exhalents, so that a larger quantity of fluid than usual is excreted from the inner coat of the intestines, and thus the fæcal evacuations are rendered more liquid and more copious. In many, both of these properties are united, and some extend their stimulus to the neighbouring viscera also, and hence produce an increased discharge of the supplementary intestinal secretions, as the bile and pancreatic juice. Cathartics differ also as to the part of the intestinal canal on which they act; the effect of some being confined to the small, and others to the large intestines, while many of them appear to stimulate the entire tube; they differ, moreover, as to the degree in which they produce their effects, and hence have been divided into three classes:—

1. *Laxatives*, which operate so mildly as merely to produce the evacuation of the intestinal contents, without producing increased secretion or stimulating any of the neighbouring viscera.

2. *Purgatives*, commonly so called, which besides remarkably

* Water has been injected into veins to produce purging in cases of tetanus.

increasing the peristaltic action of the intestines, occasion increased excretion of the fluids from the exhalent vessels from the neighbouring viscera.

3. *Drastic* cathartics, which operate in the same manner as purgatives, but with much greater energy.

In order to understand the manner in which cathartics act, it is necessary to have a knowledge of the formation, arrangement, and functions of the alimentary canal (which includes the stomach and the small and large intestines), and of the neighbouring viscera, which are implicated in the function of digestion, namely, the liver and pancreas.

After being masticated by the teeth, the food is passed into a muscular pouch called the pharynx, situated at the back of the mouth, and this by its contraction passes it into the œsophagus; the œsophagus passes down the neck into the throat, passes through a muscular orifice in the diaphragm into the abdomen, and terminates at the œsophagal, or cardiac, or left end of the stomach. The abdomen is the largest cavity in the body, extending from the diaphragm to the pelvis, which are its anterior and posterior boundaries; bounded above by the vertebræ, laterally by the ribs, their cartilages and muscles, and their tendinous expansions. In the abdomen are placed the alimentary canal and its appendages, and part of the uninary and genital organs.

The alimentary canal in the abdomen consists of the stomach, the small and large intestines.

The appendages are the liver and the pancreas.

These are held in their position, and some of them covered by a membrane called the peritoneum,—an elastic serous membrane, which secretes a serous fluid, existing in a vaporous state during life, for the lubrication of every part of the membrane, allowing the viscera to glide over each other without friction, and also without the least consciousness of their movement to the animal. The œsophagus terminates, as I have before said, in the stomach, which is situated between it and the duodenum.

For the sake of description, anatomists divide the abdomen into three regions, by imaginary transverse lines, viz.: the an-

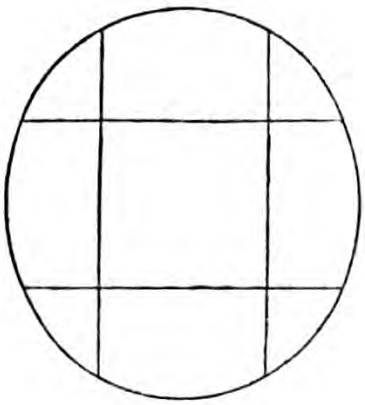
terior or epigastric, the middle or umbilical, and the posterior or hypogastric.

The epigastric region is the space comprehended between the ensiform cartilage and an imaginary line drawn across the abdomen posteriorly to the cartilages of the false ribs; this is again subdivided by imaginary lines into two more.

The umbilical extends from the line just mentioned to a line drawn from one anterior spinous process of the ilium to the other.

The third is the hypogastric, which includes the remainder of the abdomen.

These two last are subdivided in the same manner as the epigastric region:—



When the cavity of the abdomen is laid open, the large intestines present themselves first to view; consequently, they are placed underneath when the animal is standing; they are in close approximation with the abdominal muscles. The small intestines are not seen, they being situated superiorly; they may, however, be seen by turning the cæcum to the right side. The stomach is principally lodged in the left hypochondriac region, though a part of it extends into the epigastric.

The remainder of these viscera are divided into small and

large intestines, they each being again subdivided into three parts,—the small into duodenum, jejunum, and ilium; and the large into cæcum, colon, and rectum.

The stomach is a pouch or bag, formed for the reception of the food as it passes from the œsophagus; its situation has been described above. Its anterior part lies in contact with the liver, its left extremity is opposed to the diaphragm and spleen, and it lies in part on the small, but mainly upon the large intestines: this position is necessarily altered when it is in either a full or empty state. The stomach resembles an oblong cone, or, according to Percival, the air-bag of a set of bagpipes. It has a greater and lesser curvature, and a right and left extremity,—the left extremity is the largest, and is called the fundus. It has also two orifices, one situated at the left extremity, at which point the œsophagus terminates, called the œsophageal or cardiac orifice, and another at the right extremity, through which the chyme passes into the duodenum,—this orifice is called the pylorus. The stomach is composed of four coats:—1. an external, or peritoneal; 2. a muscular, or three layers; 3. a cellular; 4. a mucous. The peritoneal coat is formed by the lesser omentum. The muscular consists of three distinct fibres:—1. longitudinal, which are most external, and are continued from the œsophagus on to the greater or lesser curvatures of the stomach; 2. circular,—these are also continued from the œsophagus, investing it throughout, more particularly at its pyloric end, where they are reflexed inwards, and form the pyloric valve; 3. oblique, situated towards the great end of the stomach, commencing at the œsophagus and radiating towards the centre and great end of the stomach. The cellular coat serves to connect the muscular and mucous coats; it also allows of the ramifications of the arteries and nerves before their distribution to the membrane; it is composed of elastic fibres, and in it are situated the gastric follicles. The mucous coat is situated the most internally, and varies considerably in colour, being pink in the young animal, greyish in the adult; it differs also in thickness, being thicker at the pyloric than at the œsophageal end; that situate at the cardiac end is called the cuticular portion, and

secretes merely a mucous saliva, which merely finishes the insalivation of the food; the mucous membrane of the other half is called the villus, and secretes the true gastric juice. The mucous membrane is pitted in various parts; in these pits are the orifices of the gastric follicles which secrete the gastric juice; it is lined by epithelium, which is of the columna variety.

The *pyloric valve.* — On looking into the stomach, an orifice is seen connecting it with the small intestines, the margins of which are bounded by a folding inwards of the mucous membrane and muscular coats of the stomach, or rather, the circular muscular fibres; it leaves a constricted aperture; its office is to prevent the food from passing into the intestines in an undigested state.

Compared to his size, the stomach of a horse is very small; it will not hold more than three gallons when dead; it can, however, like all hollow muscles, accommodate itself to the bulk of its contained matter. It is in this organ that the aliment transmitted in its crude state by the œsophagus undergoes its primary and principal change in a process the object of which is to convert it into material for the support of the body; this is effected by the gastric juice, a secretion converting the aliment into chyme. The chyme passes through the pylorus into the small intestines, which serve to separate the excrementitious portion from the recrementitious.

The small intestines of the horse are sixty-six feet in length, and are divided into three parts:—

1. The *Duodenum.* This first division of the small intestines has received its name from its being equal in length to the breadth of twelve fingers in the human subject. In the horse the name does not apply, the gut being about double the length.
2. The *Jejunum,* from *jejunus,* empty.
3. The *Ilium,* from *ειλειν,* to twist.

The small intestines are composed of four layers:—1. An external or serous layer (*Peritoneum*), which invests it completely, except when the blood-vessels emerge. 2. *Muscular*

tunic, composed of two layers, an external or longitudinal, and an internal or cellular. 3. A *cellular*, serving to connect the mucous and muscular layers. 4. A *mucous* coat, which consists of—I. Epithelium; II. Valvulæ conniventes; III. Villi; IV. Lieberkuhn's follicles; V. Duodenal or Brunner's glands; VI. Solitary glands; VII. Aggregate or Peyer's glands.

I. The *Epithelium* is precisely similar to that of the stomach.

II. *Valvulæ conniventes* are folds of mucous membrane of intestine, commencing at the lower part of the duodenum (they never extend quite round the intestine), becoming smaller at the lower end of the jejunum, and lost entirely at the lower end of the ilium; their use is to form a larger mucous surface for absorption, and to retain the food in its folds, that it may not pass too quickly.

III. *Villi* are spread over the whole of the internal surface of the mucous membrane of the small intestines; they are of an elongated conical form, formed by a projection of mucous membrane, covered by epithelium, containing in them a plexus of arteries and veins, and the commencement of a lacteal; between these vessels, at the end of the villi, are placed a number of nucleated cells—the active agents in the absorption of nutritive matter.

IV. *Lieberkuhn's follicles* are a number of depressions covering the whole surface of the mucous membrane, serving, like the valvulæ conniventes, to give a greater extent of surface.

V. *Duodenal* or *Brunner's glands* are only found in the duodenum, being placed beneath the mucous membrane in the sub-mucous cellular tissue; they consist of a single duct, which divides into a number of follicles.

VI. *Solitary glands* look like small millet-seeds, of a white colour, placed beneath the mucous surface, found occasionally in the jejunum, more frequently in the ilium, consisting of a sack, containing fluid matter in its interior, having an orifice communicating with the inner surface of the intestines, on which it deposits its secreted fluid.

VII. *Aggregate* or *Peyer's glands* are a collection of solitary glands, consisting of a number of oval patches, which are found

in the ilium, opposite the attachment of the mesentery, the spaces between and around which are filled up by Lieberkuhn's follicles and villi.

The Duodenum is more capacious than either of the other small intestines, but its length is much inferior to them; it is much more highly vascular, and is at once distinguished from all other guts by receiving the ducts of two important glands, viz., those of the liver and pancreas. These ducts terminate in it about six inches from the pylorus, and it is by the action of these secretions that the chyme becomes converted into chyle; and this, by adhering to the villi, becomes separated from the ingesta, and is absorbed and conveyed into the circulation.

The Jejunum comes next to the duodenum; it is paler, less in calibre, and much longer: the coats of the jejunum are thicker than those of the ilium. The origin of its name, as well as that of the ilium, is above stated.

The Ilium consists of the remaining part of the small intestines, and terminates in the cæcum; it is retained in its position by the mesentery.

The small intestines will altogether contain about eleven gallons of fluid.

The large intestines are shorter in length, but considerably more bulky in volume than the small; they also differ materially from the latter, in being puckered into numerous folds and plaits, caused by longitudinal fibres, much shorter than the intestines. It is in these cells, when the intestines are torpid, that fæcal balls are formed, by the fæces remaining too long in them, and it is only by the pouring out of the secretions of the intestines, when it is stimulated by cathartics to increased action, that these are loosened or dissolved, and ejected from the body. Besides these masses of fæcal matter, a large quantity of gas, consisting of sulphuretted hydrogen, is always present in the canal, in a greater or less degree: this has to be expelled by the action of medicines.

These large intestines are twenty-four feet in length, and are subdivided into three parts,—the cæcum, colon, and rectum. They also possess four coats:—1. *Peritoneal*, which covers

only the anterior surface of the cæcum: it surrounds the others, except the second part of rectum in front only, and the third part not at all. 2. *Muscular*, consisting of two layers, longitudinal and circular: the longitudinal are shorter than the intestines, and give them their corrugated appearance,—the circular fibres are distributed over the whole surface; they become very thick at the postero part of the rectum, forming the internal sphincter. 3. *Cellular tissue* serves, as in the small intestines, to connect the muscular and mucous. 4. The *mucous membrane* is less vascular than in the small intestines, and consists of epithelium, Lieberkuhn's follicles, and solitary glands: their structure has been already described.

Before describing the cæcum, it is necessary to examine the manner in which the small are united to the large intestines. The termination of the ilium projects for some way into the caput-coli, and does so at right angles both with it and the cæcum, so that the contents, having once passed out of the ilium, are not likely to return; and this is further prevented by a valve, placed at this point, much resembling the pyloric valve, and called the ilio-cæcal valve: its aperture is elliptical; it consists of two flaps, one situated between the ilium and cæcum, and the other between the ilium and colon, called, from their position, ilio-colic and ilio-cæcal; its office is to allow the ingesta to pass from the ilium and to prevent their return.

The *Cæcum* or *Blind Gut* is the first subdivision of the large intestines; it originates in a bulky head, extends downwards, and terminates in a blind extremity. The cæcum differs from all the other guts in having but one opening into it; consequently, all matters that enter it must reascend into the caput-coli, to continue their route. It is corrugated into cells by the longitudinal fibres, and these cells are abundantly supplied with blood-vessels for the purposes of absorption and secretion. The contents of this gut, after death, is generally found to be fluid; it will hold about four gallons of fluid, according to Percival.

The *Colon* in the horse is a gut of enormous size, being the most capacious and longest of the large intestines; it will contain about twelve gallons of water. Commencing at the cæcum

caput-coli, it soon expands into a cavity of greater dimensions than the stomach, and then begins to contract, and continues to do so gradually in its course round the cæcum, until it has completed its second flexure, where it grows so small that it scarcely exceeds one of the small intestines. When it arises from the cæcum, this gut takes a course forward on the right side, and on arriving at the liver takes a direction directly across the abdomen to the under part of the spleen; it here makes another turn, passes backwards on the left side, and in the left iliac region makes a curve called the sigmoid flexion; it then takes a course directly backwards, and terminates in the rectum at the upper circumferent margin of the pelvis; in the horse it is a comparatively short gut, and obtains its name from the straightness of its course; it will contain about three gallons of fluid, and differs from the other large intestines in being only partially covered by peritoneum; it terminates posteriorly at the anus, where there is a circular muscle, called the sphincter ani, which, by keeping the anus closed, retains the feculent matter until so much be accumulated in the rectum as to excite a desire to discharge it.

The small intestines are supplied with blood by the anterior mesenteric artery; the duodenum receives blood also from the hepatic arteries. Their veins empty themselves into the vena porta. The nerves come from the mesenteric flexus. The large intestines are supplied from the posterior mesenteric arteries.

The stomach is supplied with blood from the gastric, splenic, and hepatic arteries. It receives its nerves from the eighth pair (pneumogastric) and from the sympathetic.

The rectum receives blood from the posterior mesenteric, internal iliac, and internal pudic.

The whole of the intestines are plentifully supplied with *lacteals;* the nerves distributed over the intestines are also very numerous. These lacteals, together with the absorbent glands and lymphatics, are those vessels which are employed in absorbing alimentary matters, and conveying them into the general circulation. The lacteals distributed in the villi of the intestines absorb the nutritious matter, and convey it into the

receptoculum chyli, a sinus variable in size, which is situated at the root of the anterior mesenteric artery; it is passed forward into the thoracic duct, which arises from the receptoculum, takes its course forward, and enters the thoracic cavity through the aortic foramen in the diaphragm, extending along the bodies of the dorsal vertebræ, until it arrives opposite the base of the heart, where it curves down to cross over to the left side, in its way to the anterior part of the thorax, passing obliquely over the trachea and œsophagus, and terminates against the middle of the left first rib in the base of the left axillary vein; in its course, the thoracic duct receives the lymphatis from the posterior extremities, pelvis, parietes, head, neck, withers, and anterior extremities; it thus conveys the aliment into the general circulation, which is now distributed by the arteries to every part of the body.

The *Liver* is the largest gland in the body, and performs the function of secreting bile. The liver of the horse differs from that of other animals in having no gall-bladder or receiver for its secreted fluid; consequently, the bile flows into the duodenum as fast as it is separated from the blood. The reason for this is well described by Mr. Youatt, who says, "A small stomach was given to the horse that the food might pass quickly out of it, and the diaphragm and lungs might not be injuriously pressed upon when we require his utmost speed; and that we might use him with little danger, compared with that which would attach to other animals, even when his stomach is distended with food. Then the stomach, so small and so speedily emptied, must be oftener replenished; the horse must be oftener eating, and food must be oftener passing out of his stomach, and consequently there is no necessity for a reservoir." The liver is situated in the right hypochondriac epigastric and left hypochondriac regions, and is confined in its situation by ligaments which, with the exception of one, the round ligament, the obliterated umbilical vein of fætal life, are merely reflexions of peritoneum; the whole of the gland is contained in a capsule called glistous capsule, which sends prolongations into the gland by the various vessels that form its structure. The gland is of a reddish-brown

colour, and is divided into several lobes, which are separated from each other by fissures which need not be described here.

It is necessary to examine the minute anatomy of the liver in considering the function of digestion.

The liver is composed of a number of asini or lobules, somewhat of an hexagonal form, united together by cellular tissue; these lobules are more distinct on the surface than in the interior of the gland. Each lobule consists of blood-vessels from the vena portæ, hepatic vein and artery, divisions of the hepatic duct and nucleated cells. The portal vein is formed by those branches which return the blood from the intestines; it arrives at the liver and divides into numerous branches called vaginal branches; by dividing, these become smaller, and are called lobular branches, and these by again dividing become still smaller, and are called interlobular. Each of these veins forms a minute plexus in each lobule, and terminates by collecting together in sublobular veins, which are the commencement of the hepatic vein.

The blood which is conveyed by the portal vein differs from the venous blood in other parts of the body, in being of less specific gravity, darker, and in containing about half the quantity of fibrine; it is said to contain portions of the soluble parts of food.

The bile separates the recrementitious from the excrementitious portions of the food; but the exact manner in which it acts is imperfectly understood. It is a secreted viscid fluid of a yellowish-green colour, strongly bitter taste, and nauseous smell, and is composed of water, biline, mucus and salts.

The hepatic artery, which goes to supply the liver with blood, divides in the same manner as the portal vein, and is distributed to the walls of that vessel and the hepatic duct; it terminates in the hepatic vein.

The hepatic veins commence at the centre of each lobule by a minute plexus; they collect blood from the terminal branches of the vena portæ and hepatic artery, and eventually terminate by emptying themselves into the posterior vena cava.

The hepatic duct commences by single branches at the

margin of the lobules; these branches become large, and unite to form the hepatic duct.

The nucleated cells are arranged in a radiating manner, and they transmit the bile to the hepatic duct by the breaking down of their walls.

In cutting into the liver, the portal vein may be easily distinguished from the hepatic; the former being accompanied by other vessels, whilst the hepatic is not.

The pancreas, known at table as sweetbread, is an elongated gland of a flattened form; it lies across the spine in the epigastric region, near the crura of the diaphragm, is of a reddish-white colour, and is separated into a number of lobules by cellular tissue,—these are again and again divided, and the terminal lobules consist of a number of follicles, which end in a duct. This duct commences at the left end of the pancreas, by the junction of two small ducts which run along the whole course, and receive a number of branches; it terminates in the duodenum, into which it pours the secretion of the pancreas. The pancreas derives its blood from the splenic, pancreatic, and anterior mesenteric arteries, and its nerves from the solar plexus; its use is to saponify the fat.

Pancreatic juice converts starch into sugar.

There is another gland called the spleen, situated in this region, which is said to be a reservoir of blood for the supply of the stomach during the process of digestion; numerous experiments have been made to ascertain its influence and operation. It has been removed altogether, and the animal has continued in health; it had been taken from a cat two years, and when she was destroyed, all the organs were healthy, and the animal had an abundance of fat.

The intestines perform two kinds of motion—a vermicular and a peristaltic; on opening the abdomen of an animal immediately after death, a wormlike movement of the intestines is perceptible; that is to say, a movement resembling the efforts that a worm makes in progression,—that is called vermicular. But besides this, there is a direct contraction of the diameter of the gut, which is caused by the circular fibres, which extend in

one series from above downwards; this movement extends successively from above downwards, and is called peristaltic motion, a term derived from the Greek περιστέλλω, to contract: by the joint action of these the food is passed along the canal and ejected from the body. The intestines are stimulated to action by matters within the canal; the immediate impression on the mucous membrane is communicated to the muscular coat, and causes it to contract, by which the contents of the gut are pushed forward to stimulate another portion whilst the former contracts; by such alternate contraction and relaxation, the ingesta is carried more or less quickly forward, according to the degree of stimulus. Substances, therefore, which excite the increase of the natural action are regarded as cathartic, and during their operation, if the natural agreement which exists between the contraction of the longitudinal and circular fibres is disturbed, colic pains are produced; if the *liquor entericus* is poured out very quickly, purging is produced. Like every other organ, however, if the stimulus is too high, inflammation supervenes. The substances which stimulate within the bounds of inflammation are called cathartics.

ALOES.

The first mention of aloes and the inspissated juice of aloes is by Dioscorides and Pliny.

The species of aloes from which the drug is obtained are generally characterised by having wooden stems, with large leaves having marginal serrations, with numerous flowers.

The juice is obtained by cutting the leaves transversely near their base, and evaporating the juice, which flows spontaneously from them, either in the sun or by the aid of heat.

Further description of the preparation will be given in considering the varieties.

The aloes sold in shops is obtained from *Aloes vulgaris*

Aloes spicata and *Aloes Socotrina.* 1. *Aloes vulgaris.*—Stem woody, cylindrical, and short; leaves green mottled, slightly brown; yellow flowers. It grows in the East Indies, Barbary, Spain, Italy, Sicily, Malta, Greece, and the West Indies. This variety yields "Barbadoes aloes;" the brownish-yellow bitter juice, which by inspissation forms aloes, is contained in parallel vessels beneath the epidermes of the leaves. 2. *Aloes Socotrina.*—Stem woody and straight, about eighteen inches high; leaves green; flowers scarlet at the base, pale in the middle, green at the point. It is a native of Socotra and the Cape of Good Hope. 3. *Aloes spicata.*— Stem three or four feet high, and the thickness of a man's arm; leaves thick, broad at the base, gradually narrowing to the point, about two feet long. This species is a native of the interior of the Cape of Good Hope, and yields "Cape aloes."

Socotrine Aloes.—This species is principally procured from the island of Socotra, which was discovered by the Portuguese in 1503, near the mouth of the Red Sea, in the Arabian province of Hadramaut. There is a variety of this plant called *purpurescens,* the juice of which becomes blood-red on exposure to the air. A few years ago, this kind of aloes was brought by way of Smyrna, and hence was frequently termed Turkey aloes; but now the principal part comes *viâ* Bombay. At the Apothecaries' Hall it is called "spiked aloes;" it is brought over in skins, said to be skins of the gazelle, contained in casks holding from eleven to fifteen hundred-weight each; the external part of each skinful is hard, but the inner part is semi-liquid; it varies also in colour, some parts of the mass being gamel red, in other parts much paler; when quite dry it is of a golden red colour, which in pounding yields a golden-yellow powder, the colour of which is deepened by exposure to the atmosphere. This kind has a very fragrant odour.

Genuine Hepatic Aloes is grown in India, and imported at London from Bombay; sometimes it is called Bombay or East Indian aloes. It arrives in skins, contained in casks holding from two to three hundred pounds. Besides being less fragrant than the Socotrine, it is distinguished from that by

its liver-opaque colour. It is obtained by evaporating the juice which flows from the transversely-cut leaves, the juice being lodged in vessels running beneath the epidermis, and the exudation is promoted by dipping the leaves in hot water. If the leaves are pressed, a mucilaginous liquid exudes, which is quite an inferior quality of aloes.

BARBADOES ALOES, obtained from the *Aloes vulgaris*, is imported from Barbadoes and Jamaica, usually in gourds, weighing from sixty to seventy pounds; but sometimes in boxes, containing fifty-six pounds each. It varies in colour from a dark black to a liver-brown: even in the same gourd there is an observable difference in colour: it has an unpleasant odour, which will readily distinguish it from the other varieties, and its odour is increased by breathing upon it. The quantity imported is stated by Sir R. H. Schomberg to be, in 1843, 4227 gourds, 8 puncheons, and 27 boxes; in 1844, 2371 gourds, 2173 packages, and 78 boxes. In Barbadoes the aloes is procured in the month of March, and the operations are described by Hughes in the following terms:—* "Every slave hath by him three or four portable tubs: the leaves being cut off near their roots, are thrown into the tubs with their broken ends downwards, and as the leaves are full of large longitudinal veins or vessels, they yield an easy passage to the juice, which is of a greenish-yellow colour, to drip out; this juice is afterwards boiled for four or five hours, the watery particles evaporate, and the remainder becomes thickened. The way to know when it is enough boiled, is to dip a stick in the liquor, and observe whether the aloes sticking to it, when cold, breaks off short: if fit, it is poured into vessels for use."

ALOES SPICATA is a native of the interior of the Cape of Good Hope, and yields the variety called "Cape aloes." The method of preparing aloes at the Cape is thus described by Mr. G. Dunsterville, a surgeon of Algoa Bay:—"A shallow pit is dug, in which is spread a bullock's hide, or a sheep's skin; the leaves of the aloes-plant are stripped off and placed on the skin,

* Hughes' "Natural History of Barbadoes," 1750, p. 154.

and are left there for a few days; the juice which exudes from the leaves is received in the skin beneath. The Hottentot then collects the juice in a bucket, or convenient vessel; it is then put into a pot, to which fire is applied to effect evaporation, during which the contents of the pot are kept constantly stirred, to prevent burning; the liquor is then cooled, and poured into wooden cases of about three feet square and one foot deep; it is then ready for the market." Aloes fetches in the colony from $2\frac{1}{4}d.$ to $3\frac{1}{2}d.$ per pound. The best Cape aloes is made at the Missionary Institution, at Bethelsdorf, a small village about nine miles from Algoa Bay. Its superiority arises, not from the employment of a better species of aloes, but from the absence of all adulterating substances, such as fragments of limestone, sand, and earth, — substances which are often introduced by manufacturers.

Of aloes known as an article of commerce, there are seven varieties, viz.: — Socotrine, Hepatic, Barbadoes, Cape Mocha, Caballine, Indian, and Curaçoa. The terms, Socotrine, Hepatic, and Caballine, have been employed more to denote the quality of the aloes: Jussieu* states that he saw three varieties prepared from the *Aloes vulgaris* at Morvedio, in Spain.

According to Winhler, the composition of aloes is as follows: —

	Socotrine.	Barbadoes.
Bitter matter - - -	50	60
Resin - - - -	50	35
Albumen - - -	0	5
	100	100

Pure aloes is almost completely soluble in boiling water.

Physiological Effects.—Aloes is the ordinary purgative employed by veterinary surgeons. In the horse, previously prepared by two or three bran-mashes, the dose is from ʒiv. to ʒvij.; it acts slowly, requiring from eighteen to forty-eight hours for its operation. In the dog the dose is from ʒj. to ʒiij. Barbadoes is supposed to be more effective than Cape aloes, in the ratio of 7 to 5. Aloes acts as a purgative to oxen, sheep, and pigs.

* "Elements of Chemistry," by J. A. Chaptal, vol. iii. p. 86. 1791.

The dose for a man is from gr. ij. to gr. v.; it is best when administered in the form of a pill, made with honey and mucilage, and takes eight, twelve, or twenty-four hours to act. Aloes is said to produce purging when applied to a blister or an issue.* Dr. Wedekind states, that the operation of aloes depends on the increased secretion of bile, which is produced by the specific action of this medicine on the liver; others state that it exerts its influence on the colon and rectum. Mr. Morton, in an examination after death caused by super-purgation from an over-dose of aloes, found that the whole of the mucous lining of the intestines was inflamed, and particularly that of the cæcum and colon—the rectum not being involved in so marked a manner. Dr. Greenhow ascribes a diuretic effect to aloes. Moiraud, a French veterinarian, injected into the veins of a horse, ʒiv. of aloes dissolved in water, with a little alcohol, and the next day ʒj. more, without any other effect than the evacuation of a large quantity of urine: on analysing the urine, no traces of bile were found. Christison asserts that the cathartic property of aloes is much increased by its combination with sulphate of iron, and that its irritating action on the rectum may be counteracted by combining it with extract of hyosciamus.

Use.—Aloes is not adapted as a purgative in those cases in which immediate purging is required. It is well fitted for cases of costiveness, when the bile is scantily secreted, and for torpid conditions of the large intestines. The use of this agent is not advisable in inflammatory conditions, and organic disease of the liver and intestines; and should not be employed in the case of mares during pregnancy.

Aloes may be administered advantageously under the following circumstances:—in loss of appetite, arising from a debilitated condition of the digestive organs, accompanied by costiveness; in cases where the large intestines are much loaded; in cerebral affections; and when it is desirable to purge a horse when coming from grass, or when the animal is suffering from plethora, this purgative may be safely used.

* Dr. Monro, 1781.

Owing to its disagreeable taste, this drug is generally given in the form of a ball. The purgative mash of the College is composed as follows: —

" Take of aloes, broken into small pieces, 8 parts.
„ olive oil - - - - 1 part.
„ treacle - - - - 3 parts.*

The aloes and oil are melted together in a water-bath, and, when removed from the fire, the treacle is added, and the whole well stirred together." The dose of this mash is from ʒvj. to ʒxij.

A solution of aloes may also be used: —

" Take aloes, in small pieces, - - 1 part.
„ aqua dist. - - - 7 parts.
„ sp. vini rect. - - - 1 part.

Dissolve the aloes in the water, and then add the spirit. The dose is from ℥iv. to ℥viij."

Before the administration of aloes, the horse should be prepared by the administration of a mash, the mash itself acting as a stimulant on the intestines.

The following table is taken from Mr. Morton's " Manual of Pharmacy." Twelve horses were ordered purgatives in one day; the quantity given to each horse was ʒvj. and they were prepared over night in the usual manner.

CAPE ALOETIC EXTRACT.

No.	Time taken to produce Action.	Exercised or not.	Evacuations.	Action.	Length of Time kept up.
1	19 hours	Exercised	Several	Free	The next morning the fæces were become consolidated.
2	24 do.	Do.	3 or 4	Do.	
3	24 do.	Not	Do.	Moderate	
4	27 do.	Exercised	Do.	Do.	Do.
5	27 do.	Do.	Do.	Do.	Do.
6	Scarcely acted at all	Not	- -	- -	Do.

* In addition, a little powdered ginger might be added with benefit, in order to prevent its griping effects.

BOMBAY ALOETIC EXTRACT.

No.	Time taken to produce Action.	Exercised or not.	Evacuations.	Action.	Length of Time kept up.
1	15 hours	Not	Many	Free	Purging continued throughout the next day.
2	17 do.	Exercised	3 or 4	Moderate	Fæcal matter the next morning still in a relaxed state.
3	17 do.	Not	5 or 6	Free	Do.
4	18 do.	Do.	3 or 4	Moderate	Do.
5	20 do.	Do.	5 or 6	Do.	Do.
6	27 do.	Do.	Relaxed only.	- -	Next morning the fæces becoming consolidated.

The dose of aloes for the adult horse is from ʒij. to ʒx. If used for the foal, the dose, until the animal is several months old, may be easily ascertained by allowing gr. v. for every week of its age. For cattle, the dose is from ℥j. to ℥ij. For sheep, ℥ss. to ℥j. For dogs, ϑj. to ʒj. For swine, about ʒiv.

LINSEED OIL. — LINI OLEUM.

The oil is obtained by expression from the seeds of the common flax (*Linum usitatissimum*).

From the earliest ages, flax has been employed in the manufacture of cloth; and the Bible informs us that Egypt was celebrated for its production. Dutrochet asserts that mummy-cloth was made of flax. It is a shrub about eighteen inches high, slender, branched above; leaves distant; flowers large, purplish blue; capsule globular, about the size of a small pea.

The seed of the flax, commonly called *linseed*, is small, about

a line long; oval oblong, flattened on the sides with acute edges; smooth glossy brown externally, yellowish white internally; odourless, and has an oily mucilaginous taste; the seed-coat is mucilaginous, the nucleus oily. The cake left after the expression of the oil is usually denominated oil-cake. When ground to a fine powder, the seed forms linseed meal.

The substance termed flax is prepared from the fibrous portions of the back of the plant. The short fibres which are removed in picking, form tow. Of flax is made linen, which when scraped becomes lint.

This plant is common in corn-fields, and is extensively cultivated in this and other European countries, both for its fibre and oil.

To prepare linseed oil, the seeds are first bruised or crushed, then ground, and subjected to pressure in the hydraulic or screw press. Cold-drawn linseed oil is paler coloured, less odorous, and has less taste than that prepared by the aid of steam heat. The seeds yield from eighteen to twenty per cent. of oil by cold expression, and by the action of heat from twenty-two to twenty-seven per cent.

Chemical Properties. — The seeds consist of vegetable mucus, containing free ascetic acid and some salts, extractive starch, wax, soft resin, gum, albumen, yellow colouring matter, and fixed oil. Linseed oil is composed of oleic and margaric acids; it is soluble in alcohol, but more so in ether. On exposure to the air, it concretes into a transparent varnish; and is consequently called in the arts, a drying oil. It is a mild laxative, and also acts as an emollient; it is employed as a cathartic for the horse, in doses of from one to two pints, and to cattle it may be given in like quantities. Mr. Youatt believes it to be little inferior to castor oil as a purgative, and it is much cheaper. To sheep it is occasionally administered when the sulphate of magnesia will not act, or when intestinal irritation is present; the dose is from two to three ounces.

Its activity may be much increased by the addition of a few drops of croton oil.

Linseed oil is administered advantageously in inflammatory

and spasmodic affections of the bowels; but its most ordinary use is in the preparation of liniments. It is seldom administered internally in the human subject.

The seeds are used for fattening cattle, as is also the linseed-cake; linseed meal, the meal of the seeds deprived of the oil by expression, is employed in the formation of poultices.

There is another variety of flax called the *Linum catharticum*, or purging flax, first mentioned in the sixteenth century, which is from two to six inches in height, of slender stem, with small white flower; it is found on pastures and commons, and is of bitter taste; its effects are cathartic, and occasionally diuretic, but its action is uncertain. Formerly it was used in cases of rheumatism, but it is now obsolete.

OLIVE OIL. — OLEUM OLIVÆ.

Oleum è fructu expressum.

Obtained from the European olive (*Olea Europea*); few vegetables have been so repeatedly noticed and described by the ancient writers as the olive-tree. In all ages it has been the emblem of peace, and is very frequently referred to in the Sacred Writings. Hippocrates employed it in medicine, and it was brought by the ancient Phœnicians to France, about the year 680 B. C.

The olive is a moderate-sized tree, with a hard-veined wood (used for cabinet-work); the leaves, which are in pairs, are green above and hoary beneath; flowers small and white; it yields a hard nut. Of spontaneous growth in Asia, it has migrated into the south of Europe, the Mediterranean Islands, and the north of Africa; there are two varieties, the wild and the cultivated; the latter yields the largest nut. This tree yields the resin oil and the nut.

The preserved or pickled olives, so admired as a dessert, are

the green unripe fruit deprived of part of their bitterness by working them in water, and then preserving them in aromatized solution of salt.

To express the oil, the fruit is bruised in a mill immediately on being gathered, and the paste submitted to pressure: the first product has a greenish tint, and is termed " Virgin Oil." The cake is then removed from the press, broken up with the hand, moistened with boiling water, and re-pressed; this is left standing, and the oil separates from the water, and affords a second quality. One hundred pounds of olives will yield about thirty-two pounds of oil.

The quantity of olive oil imported into this country in 1850, was 5,237,316 gallons.

Olive oil is a transparent unctuous fluid, of a yellow colour, pale or greenish, according to quality, the finer being of the lightest shade, and when good, of a bland, oily taste. It is not a drying oil, and is therefore preferred for greasing delicate machinery, such as watches and clocks.

There are several varieties of olive oil. *Provence*, the produce of Aix, is most esteemed; *Florence* is a very fine kind, imported in flasks surrounded by a kind of net-work, and is used at table under the name of salad oil; *Lucca* and *Genoa* are two other kinds from Gallipoli, and are the largest importation into England of any other varieties.

Olive oil is often adulterated with some of the cheaper fixed oils, as rape oil. For ordinary purposes its purity may be ascertained by shaking the oil in a bottle half filled; when it is pure, the surface of the oil soon becomes pure by repose, but if it be adulterated a number of air-bubbles remain. It is composed of

Oleine	72 parts.
Margarine	28 „
	100

Olive oil can be viewed by the veterinarian only as a demulcent and emollient, for as a laxative it is very mild and uncertain

in its operation; for ordinary purposes the second expression may be used, and its dose the same as linseed oil. It forms a useful addition to enemata, is used as a vehicle for more active substances, particularly in the formation of liniments, and also for smearing surgical instruments, as bougies or catheters.

It is seldom administered to the human subject, and only as a laxative, when its dose is from ℥j. to ℥ij. Half an ounce injected into the veins of a dog produced death.

I have thought right to make these few remarks on this substance, as it has been denominated a purgative by several veterinary writers.

THE CASTOR-OIL PLANT, OR PALMA CHRISTI.

Ricinus Communis.

The castor-oil plant was known in the most ancient times. Caillaud found the seeds of it in some Egyptian sarcophagi, supposed to have been at least 4000 years old, and Herodotus and Hippocrates both mention it.

In northern countries it seldom exceeds the height of three or four feet, whereas in warm climates it reaches twenty or thirty feet. Its leaves are large, of a dull green colour; its fruit is a three-celled capsule, each cell containing one seed; the seeds are oval, about four lines long, three lines broad, and a line and a half in thickness. It is a native of India, and is found in Africa and in North and South America, but is cultivated in England, and extensively so in the West Indies. Botanists describe six varieties. Geiger analysed the seeds with the following result:—

Seed-coats:		
Tasteless resin and extractive - -	1·91	
Brown green - - - -	1·91	
Ligneous fibre - - - -	20·00	
	——	23·82
Nucleus of the seed: —		
Fatty oil - - - - -	46·19	
Gum - - - - -	2·40	
Casein (albumen) - - -	0·50	
Ligneous fibre with starch (hardened albumen) - - - -	20·00	
	——	69·09
Lost moisture - - - - -		7·09
		100·00

Oleum ricini may be obtained from the seeds by expression, decoction, or by the agency of alcohol. The fixed oil of the seeds, which alone is officinal, is obtained by expression with or without the aid of heat, the seed-coats being usually first removed: that obtained without the aid of heat is called cold-drawn, and bears the highest character; this is the process followed in the West Indies, and for the finer qualities of oil in the East: more generally, however, in the East Indies, the seeds are boiled in water, dried and bruised, and again boiled in water till the oil separates and floats on the surface. The seeds yield about thirty per cent. of oil.

Castor oil is a viscid oil, usually of a pale-yellow colour, with a slightly nauseous odour and mild taste. It is lighter than water, specific gravity 969. It is readily soluble in alcohol or ether. In the London markets there are chiefly three sorts of oil,—the oil expressed in London, the East Indian oil, and the American. It is also occasionally imported from the West Indies and from Australia. It is occasionally adulterated with common fixed oils; this may be detected by its solubility in alcohol.

On animals generally, castor oil acts as laxative or mild purgative. Horses require a pint or more for a dose; smaller animals, as dogs, require much smaller doses, from ℥ss. to ℥iss., according to Moiraud. Mr. Youatt describes its operation in

reference to the horse as both dangerous and uncertain, and it is seldom employed. In the case of dogs, Mr. Morton recommends it, when combined with other agents and forming a castor-oil mixture, viz. : —

"Castor oil - - - - - 3 parts.
Syrup of buckthorn - - - - 2 „
Syrup of poppies - - - - 1 part.
Mix together. Dose from 1 to 2 tablespoonfuls."

The ancients employed castor oil chiefly as an external application ; and it is still used in India in cutaneous diseases.

Dr. Ainslie, in his work on "Materia Medica of Hindostan," recommends the leaves of the plant, when made into balls, in conjunction with chilies and tobacco-leaves, as an excellent remedy for gripes in horses.

Injected into the veins of a man, it produced gripes and purging, and caused an oily taste in the mouth. Hence it would appear to have a specific action on the mucous lining of the alimentary canal.

Its use is recommended when it is desirable to avoid abdominal irritation; in inflammation of the alimentary canal, as enteritis, peritonitis, and dysentery; in obstruction and spasmodic affections of the bowels, as intussusception and colic; before and after parturition; and in inflammation of the kidneys or bladder.

It has also been recommended for expelling tape-worms, but at present is not much employed for that purpose.

CROTON OIL.

This remedy, perhaps more used formerly than at the present time, is procured from the *Croton Tiglium*, or purging croton, a tree from fifteen to twenty feet high, with smooth ash-

coloured bark, a native of the Continent of India, of Ceylon, and of the islands forming the Indian Archipelago.

Croton seeds resemble much in size and shape the castor seed. They are of an oval form; their length about six lines; their thickness from two to three, and their breadth from three to four. The seeds are without odour; and on tasting them, the sensation is at first mild and oleaginous, afterwards acrid and burning. The proportion of shell and kernel in 100 parts, is shell 36, kernel 64 = 100. They consist of fixed oil, gum, albumen, and lignin; 2 cwt. of seeds yield 51 lbs. of oil. On animals they are powerful local irritants; they act as a purgative to the horse, and may be used in cases where a ball cannot be given. The kernel should be pounded, and from twenty to thirty grains given as a dose in the mash.

In the human subject, 1 grain will frequently produce full purgations.

The oil is expressed from the seeds. This is generally done in India, but it is also expressed in England; the persons engaged in the operation are much affected by it, suffering from irritation of the eyes and air-passages, and from purging.

It is usually employed in tetanus, as it can be easily introduced into the mouth; the mode of administration is from a spoon filled with common oil, upon which from ♏x. to ♏xij. of the croton is dropped.

According to some veterinary surgeons, ♏xxx. have caused death.

On post-mortem examination, the large intestines have been found more inflamed than the small ones.

CALOMEL, OR CHLORIDE OF MERCURY.

Before entering on the description of calomel, I think it right to consider the metal, mercury.

We are told, on the authority of an oriental writer, that the

Egyptian magicians, in their attempts to imitate the miracles of Moses, employed wands and cords containing mercury, which, under the influence of heat, imitated the motion of serpents. This substance is mentioned by Aristotle, and Theophrastus and Dioscorides describe the process of procuring it from cinnabar.

It was first employed medicinally by the Arabian physicians, Avicenna and Rhazes, but only externally, against vermin, and also in cutaneous diseases. Paracelsus was the first who employed it internally.

It has received numerous names,—hydrargyrum, from *ὕδωρ, water*, and *ἄργυρος, silver;* and others from its mobility and liquidity, as well as from its similarity to silver, as argentum vivum, aqua argentea, aqua metallorum, and quicksilver. Its name, mercury, is adopted from that of the messenger of the gods, on account of its volatility.

Mercury is comparatively a rare substance; it is found in the metallic state, either pure, in the form of globules in the cavities of the other ores of this metal, or combined with silver. Sulphuret of mercury (native cinnabar) is the most important of the quicksilver ores, since the metal of commerce is chiefly obtained from it. The principal mines are those of Idria, in Carniola (Austria), and Almadea in Spain; it is also found in Germany, Hungary, South America, and in China.

Mercury is prepared by distilling the native cinnabar with quick-lime or iron-filings; at Almadea the ore is roasted, by which the sulphur is converted into sulphurous acid, and the mercury volatilized $Hgs. + 2O = Hg. + So^2$. It is imported in cylindrical wrought-iron bottles, holding from 60 lbs. to 1cwt., the mouth of each being closed with an iron screw.

The principal supply of mercury was from Spain, under a contract between the Spanish government and Messrs. Rothschild. This monopoly caused the price to rise from 1*s.* 10*d.* per lb. in 1831, to 4*s.* in 1849, but since the discovery of quicksilver in California the value of it has decreased, so that in February, 1854, it was 2*s.* 1*d.* per lb. Immense quantities are used in gold and silver mines, for the purpose of separat-

ing the metals. In 1853, 1,868,120 lbs. were imported into this country. The yield of India is much less than that of Almadea. The quicksilver mines of Tuscany have also been recently worked; they are situated at Monte Amiato, Levigliano, and Val di Castello. Only one importation has been received into this country from China; that was in the year 1844, when the price was 4*s.* 6*d.* per lb.

Quicksilver is an odourless, tasteless liquid metal, having a whitish colour like silver; its symbol is Hg.; when intimately mixed with fatty bodies, it loses it liquid character, and is then said to be killed.

From various experiments, we learn that when mercury is injected into veins of animals, it collects in the small veins of neighbouring organs, and acts as a mechanical irritant; thus, if thrown into the jugular vein, and the animal is examined after death, little abscesses and tubercles have been found in the lungs, in each of which was a globule of quicksilver as the nucleus.

Some people assert that this liquid, when swallowed, is poisonous; others hold a contrary opinion: the truth appears to be, that so long as it retains the metallic state it is inert, but should it combine with oxygen in the alimentary canal, it acquires activity.

The vapour of mercury is very injurious. In 1810, the "Triumph," man-of-war, and "Phipps," schooner, received on board several tons of quicksilver saved from the wreck of a vessel near Cadiz; in consequence of the rolling of the bags, the mercury escaped, and the whole of the crew became more or less affected. In three weeks 200 men were salivated, two died, and all the animals, cats, dogs, sheep, fowls, a canary-bird, and even the rats, mice, and cockroaches, were destroyed.

Metallic mercury has been used as a chemical agent to dissolve silver coins which have been swallowed; and as a mechanical agent to remove obstruction of the bowels, as intussusception; but owing to the position of the intestines of the horse, in our practice it would be of little use. It has been administered in the human subject in doses of from j. to 1 lb.

The effects of the different preparations of mercury which are used in medicine are very complex. The topical are generally irritant; remotely they act as special stimulants, both to secretion and excretion. But the most remarkable effect of mercury is its action on the salivary gland, and is termed salivation. When introduced in the form necessary to such a result, there is, first, increased vascular action, shortly followed by a slight mercurial fœtor; the gums then become swollen, the lining membrane of the cheeks presents a leaden hue, and a copious flow of saliva takes place; if this agent be continued, ulceration of the gums, palate, etc., precedes slow fever and rapid emaciation. In the human subject it also produces an eruptive disease of the skin, called mercurial eczema; but such disease has not as yet been observed in the horse.

The therapeutic powers of mercury depend on its antiplopatic, alterative, and deobstruent properties. Mr. Morton states that in the metallic state, mercury has no action on the animal system; its compounds, however, are very energetic, being general and powerful excitants to glandular structures, and some of them are caustics. Those employed in veterinary practice are the protoxide and the nitrate, in the form of ointment, and the proto- and bi-chloride of mercury. The sulphuret was at one time used as an alterative, but is now considered an inefficient compound. Mercurial soaps are advantageous in mange, and mercurial ointment, after blistering, is useful in promoting the growth of hair.

HYDRARGIC SUB-CHLORIDUM; CHLORIDE OR PROTO-CHLORIDE OF MERCURY; SUB-CHLORIDE OF MERCURY, OR CALOMEL.

Symbol $Hg_2 Cl = 236$.

Beguin in 1608, and Oswald Croll, in 1609, are the first Europeans who mention this compound;—its discoverer is not known.

The term calomel (*calomelas*, from *καλός*, good, and *μέλας*, black) was first used by Sir T. Jurquet de Mayenne (about 1650) in consequence, as some say, of his having a favourite black servant who prepared it; by others, because it was a good remedy for black bile. It is prepared in the following manner at the London College: —

"Take of purified mercury by weight - - 4 lbs.
„ sulphuric acid - - - - 3 lbs.
„ chloride of sodium - - - 1½ lb.
„ distilled water as much as sufficient.

"Boil two pounds of the mercury with the sulphuric acid in a glass vessel until the bipersulphate of mercury remains dry. When this is cold, triturate it with the remaining two pounds of mercury in an earthen mortar, so that it may be thoroughly mixed; then add the chloride of sodium, and rub them together till globules of mercury are no longer visible; afterwards sublime. Reduce the sublimed matter to a very fine powder, wash it carefully with boiled distilled water, and dry it."

Decomposition. — By boiling mercury in sulphuric acid, a portion of the latter becomes decomposed, being resolved into sulphurous acid, which escapes in a gaseous form, and oxygen, which combines with the metal, converting it into an oxide; this is dissolved by the undecomposed acid, and converted into a sulphate; on the addition of the remainder of the mercury this is changed into a proto-sulphate.

When this is sublimed with the chloride of sodium, a double decomposition takes place; the oxygen of the mercury combines with the sodium, forming soda, which the sulphuric acid converts into sulphate of soda: and this remains at the bottom of the vessel, whilst the liberated chlorine unites with the vaporized mercury; and these, rising together into the head of the vessel, are condensed, constituting the proto-chloride of mercury. This being a crystalline compound, is directed to be pulverized, and subsequently washed.

There are several other modes of preparing it, each college giving a different formula.

Calomel is insoluble in water, alcohol, or ether. The following is its composition: —

Mercury - -	2 atoms.	Mercurial vapour - -	1 vol.
Chlorine - -	1 atom.	Chlorine Gas - -	½
Sub-chloride of calomel	1 atom.	Vapour or calomel -	1 vol.

When completely pure, calomel is completely vaporized by heat.

Wepfer, Viborg, Flosmann, Gaspard, and Annesley have examined the effects of calomel on dogs, horses, and pigs, but without any remarkable result. Viborg gave half an ounce with six ounces of water to a horse, and it caused cough, heaving of the flanks, quick pulse, enfeebled appetite, and in twenty-four hours loose stools. Annesley asserts that large doses of calomel in dogs diminish the vascularity of the gastro-intestinal membrane.

This agent is supposed to act primarily on the liver, and on the pancreas, causing them to pour out an increased secretion; it also acts on the intestinal mucus. It may be regarded as one of the most useful of the preparations of mercury; and being a general excitant to glandular structures, it is often combined with other agents. As a purgative, administered alone, in the horse it is unsafe; it is, however, useful as an adjunct to other cathartics. Combined with opium, it has been found of service in cholera and dysentery, by promoting a return of the natural functions of the alimentary canal. It is much resorted to in order to effect the expulsion of worms, in doses of from ʒj. to ʒij. over night, given in the form of a ball, followed by aloetic purge next morning. It is of the greatest service in hepatic affections; and, combined with other purgatives may be advantageously used in head-affections. Its local uses are numerous. In diseases of the Schneiderian membrane it is employed as a snuff, and is sometimes blown into the eye to remove spots on the cornea. It is employed in chronic skin diseases, in the form of ointment. Professor Spooner has employed the proto-oxide in combination with chloride of calcium in solution, forming black wash, in sluggish, ill-conditioned ulcers. This is made by

Calomel - - - - - - -	℈ ij.
Lime-water - - - - - - -	♁ j.

Mr. Youatt recommends it in chronic cough and glanders. Its dose in the human subject is from gr. ij. to gr. vj.

Calomel is decomposed by the alkalies and their carbonates; also by iron, lead, and copper: hence, in dispensing it, metallic mortars should not be employed.

In a paper read to the Veterinary Medical Association, May 7th, 1844, on Calomel, Mr. T. Leech recommends its use in sub-acute inflammation of the larynx, and in roaring: but any beneficial result must be very problematical. He also recommends it in periodical ophthalmia, and describes its effect as diuretic.

This agent will produce ptyalism in the horse, whether taken internally or applied externally; but the horse is not nearly so liable to this effect as man.

SULPHUR OR BRIMSTONE.

Symbol S. Equivalent weight 16.

It is an elementary substance, found in large quantities, in an impure state, in the neighbourhood of volcanoes; it is also found combined with metals in many parts of the earth, and with hydrogen in many mineral waters.

Sulphur (from *sal*, salt, and *πῦρ*, fire) has been known from the most remote periods of antiquity. It is mentioned by Moses in Gen. xix. 24., and also by Homer. It is found in both kingdoms of Nature. In the inorganized kingdom it is found as above, near volcanoes, and in the organized kingdom both in animals and plants.

This substance is procured in two ways, by the purification of native sulphur, or by the decomposition of native sulphurets; formerly it was principally imported into this country from Sicily, now vast quantities are prepared in England. Sulphur contains many impurities, it is therefore sublimed, and

rises in vapour before it is completely fused; it is prepared on a large scale by conducting the vapour of the melting sulphur into close chambers, where it is deposited in the form of a white powder. Two kinds of sulphur are common; roll sulphur, or brimstone, and flowers of sulphur, or sublimed sulphur. Both are of a yellowish-green colour, with an almost imperceptible taste, but emitting a faint, peculiar odour when rubbed.

The quantity of sulphur imported into England in 1853 was 921,868 cwt.

Sulphur is insoluble in water and in alcohol. If sulphur is ignited, it burns with a lambent blue flame, and is converted into sulphurous acid gas. It combines with three equivalents of oxygen to form one of the most powerful acids, viz., sulphur acid, So_3.

Flowers of sulphur seldom contain any impurities; those of a fixed nature may be detected by subliming. Roll sulphur usually contains a large quantity of orpiment (sesqui-sulphuret of arsenicum). and therefore should not be used in medicine.

At the Veterinary School of Lyons, it was found that a pound of sulphur killed horses by producing violent inflammation, recognizable during life by the symptoms, and after death by the morbid appearances. Mr. Morton states that he has given this quantity more than once, and it was followed by much intestinal irritation and a relaxed state only of the fæces: he states, that when the bowels of cattle and sheep have been excited to action by the sulphate of magnesia, the action is to a moderate extent, and with perfect safety, kept up by doses of sulphur; the quantity of the former being from six to eight ounces, and of the latter from two to three ounces. It may be advantageously joined with purgatives. As an alterative it is usually combined with nitrate of potassa. The dose he prescribes is from ʒj. to ʒij. It appears to act by stimulating the muscular coat of the intestines; the evacuations caused by it being usually solid. Youatt observes, that when given alone it has little effect, except as a laxative, in doses of from ʒvj. to ʒviij. It is an useful ingredient to the cough or fever ball, as it stimulates the secreting organs, particularly the bronchial mem-

brane; it is also much used as an external application in various skin diseases. It is also applied as a vapour bath.

The dose for sheep as a laxative is ℥ij., as an alterative ʒvj. For dogs, as a laxative, ʒvj., as an alterative ʒj. to ʒij. Sulphur is usually administered as a bolus, or suspended in gruel or oil. The following is often given to horses and cattle: —

Sulphur ℥j.; Tartar emetic ʒj.; Nit. Pot. ℥ij.

MAGNESIÆ SULPHAS; SULPHATE OF MAGNESIA.

Symbol, $Mg.O.So^3$.

This salt was originally procured from the Epsom waters, in 1697, by Dr. Grew. It has a variety of names, as Epsom salts, Sal anglicum, Sal sedelitzense; at the Lymington Salt Works it is called physical salt, to distinguish it from common salt. It is found in sea-water and in several mineral waters, and occurs as an efflorescent on other minerals. It was formerly prepared by evaporating the water of the Epsom springs, but is now obtained from two great sources — dolomite and bittern.

Dolomite, or magnesian limestone, is a mixture or combination of the carbonates of magnesia and lime. It occurs in great quantities in the counties of Somerset, York, and Nottingham, and is largely employed for building; York Minster and Westminster Hall are built of it.

The method of preparing sulphate of magnesia from dolomite is to heat this mineral with dilute sulphuric acid. Carbonic acid escapes, and a residue composed of sulphate of magnesia and sulphate of lime is left; these are separated from each other by crystallization, and there are also other methods of obtaining it, viz., from bittern. Bittern, or the bitter liquor, is the residual liquor of sea-water, from which common salt has

been separated. The liquor is boiled for some hours in pans; during the ebullition some common salt is deposited, the lighter impurities are removed by skimming, and the concentrated solution is removed into wooden coolers, and allowed to crystallize.

It is usually met with in small circular crystals, transparent and colourless, inodorous, with an extremely bitter disagreeable taste, and is composed of

Magnesia - - - - - - -	1 atom.
Sulphuric acid - - - - - -	1 atom.
Water - - - - - - -	7 atoms.
Crystallized Sulph. Mag. - - - - -	1 atom.

It is soluble in its own weight of water at 60°, and in three-quarters that of its weight of boiling water, but insoluble in alcohol.

This salt is seldom adulterated, but occasionally some portion of sulphate of soda is found in it. When this is present, it will communicate a yellow tinge to the flame of alcohol.

The action of this drug on the horse is variable; sometimes it acts as a diuretic, at other times as a laxative. It has been found to alter the nature of the secretions from the alimentary tube; hence, in spontaneous diarrhœa, its exhibition is followed by a healthy state of the bowels. It is used, however, for the horse principally to promote the purgative effect of glysters; from ℥vj. to ℥viij. may be dissolved in water. Mr. Youatt states that it requires often to be administered three times before it acts; it should never be used in inflammation of the intestinal tube. It is chiefly employed as a purgative for cattle and sheep, and with these animals supersedes almost all other aperients: the dose for the former is from ℔ j. to ℔ jss., and for the latter from ℥j. to ℥ss. The combination of from ʒss. to ʒij. of ginger should never be withheld.

Sulphate of magnesia is a refrigerant cathartic, operating mildly but effectually, augmenting the secretions and promoting the peristaltic action of the intestinal canal; the evacuations are

watery, and are not accompanied by either nausea or griping; its action is greatly assisted by the addition of some croton beans. In the human subject it is administered in doses of from ʒss. to ʒjss.; some carminative, as peppermint-water or tincture of ginger, being added. As a purgative enemata ʒj. to ʒij. of it may be added to the ordinary clyster.

SODÆ SULPHAS. — SULPHATE OF SODA. GLAUBER SALTS.

This substance received the name of Glauber salt from its having been first prepared by a German chemist of that name. It is found in many mineral waters, but as an article of commerce it is obtained as a secondary product in the making of the hydro-chlorate of ammonia. It consists of

Soda - - - - - - -	1 equivalent.
Sulphuric acid - - - - - -	1 „
Water - - - - - - -	10 equivalents.

It is a solid white salt, crystallized in long prisms, inodorous, with a cooling, saline, very bitter taste; on exposure to the air it loses its water of crystallization, and a white powder is left; it is soluble in an equal weight of boiling water, but insoluble in alcohol. According to Mr. B. Clark, it is a diuretic only to the horse.

For cattle it is used largely as a purgative, in doses of a pound or more. Its action depends on its promoting the secretion from the mucous surface of the intestines. It is, however, fast giving place to the sulphate of magnesia, which is more certain in its operation.

CLYSTERS, GLYSTERS, OR ENEMATA.

The common form of these agents for the horse is liquid. The objects for which they are administered are, in order to empty the bowels of fæces, and also to induce a cathartic to commence its operations when, from want of exercise or due preparation, it is tardy in producing the desired effect. They operate first by softening the contents of the intestines, and secondly by exciting irritation in one portion of the canal, which is communicated throughout the whole.

The intimate relation between every part of the alimentary canal, and between it and the whole general system, enables medicines to operate in a similar manner, whether taken into the stomach or injected into the intestinal canal. In many instances, and especially in dogs, the stomach is in such an irritable state that it rejects all kinds of medicines; in other instances, large quantities of medicines are occasionally taken by the mouth without producing any effect; in others again, deglutition is impeded by lockjaw, cerebral affections, or other causes. In all these, clysters may be resorted to, and they greatly aid the operation of cathartics by exciting the larger intestines. The usual enema is warm water, the quantity thrown up being about a gallon; this may be rendered more stimulating by the addition of common salt, oil, or aloes.

There are various instruments for administering clysters; the most convenient are,— 1st. The common pipe and bladder where only a small quantity is required to be given. 2nd. The force glyster-pipe, which consists of a long flexible tube furnished with a hand-pump, by the aid of which any desired quantity may be thrown in. The impropriety of introducing long tubes into the intestines will be sufficiently shown on reference to "Veterinary Medical Transactions," vol. iii. p. 252. The quantity of fluid injected must be attended to, for if this be too great in addition to the action of the agent given, we shall have a distended state of the intestines, and there will

follow a more rapid expulsion of the clyster than is desirable, and on the other hand it should not be too small, for then the desired object is not obtained.

Enemata are also given for the killing of worms, for restraining diarrhœa, for nourishing the body, and for allaying spasm of the stomach and bowels.

Before passing the pipe into the rectum, it should always be carefully greased or oiled.

There is another intrument recommended by Mr. Gamgee in the " Veterinarian " for January, 1856.

Another manner of emptying the rectum is by the operation of backraking; to perform this, it is necessary that the arm should be rubbed over with soap, so that it may easily slip into the rectum; the hand should be carefully passed forward, taking care not to employ any force. This may not be a very surgical operation, but it is known to have been employed for a considerable time with much success. The practitioner should always do this himself, as an inexperienced hand is very liable to tear the coats of the intestines, and so destroy the animal.

There is yet another mode of assisting the operation of cathartics, and that is by the application of some stimulating liniment, as the *Linimentum terebinthinæ*, or camphorated oil, to the surface of the abdomen; or even cloths, soaked in cold water, will frequently produce the desired result.

BRAN MASHES.

Bran, in the form of mashes, is often given as a laxative, and its general effect is to loosen the bowels, so as to render them fit for the operation of a cathartic. It is obtained from the *Triticum vulgare*, or common wheat, a plant so familiar as to render description unnecessary, and cultivated very generally as an article of food.

The component parts into which wheat is separated by the miller is, out of 504 lbs. of wheat, as follows: —

Flour - - - - - - - -	392 lbs.
Biscuit or fine middlings - - - - -	10 „
Toppings or specks - - - - - -	8 „
Best pollard, or twenty-penny - - - -	15 „
Fine pollard - - - - - - -	18 „
Bran - - - - - - - -	50 „
Loss by grinding, &c. - - - - - -	11 „
	504

Bran is composed of water, coagulated albumen, oil, husk, with a little starch and saline matter.

Bran is made into a mash with warm water. Its operation depends upon the silicious matter contained in it, which mechanically irritates the mucous surface of the intestines.

CATHARTICS.

The symptoms independent of the existence of specific disease, and exclusive of a confined state of the bowels, which indicate the necessity for the administration of cathartics, are a fulness of the belly, without tenderness or pressure, the urine of a high colour, owing to its being loaded with bile or fluid dejections.

The first general intention in administering purgatives is to clear the intestinal canal, for which purpose they must be given in full doses, and those selected which will act on the whole course of the canal. The second is to correct unhealthy secretions. The third is to augment the discharge from the intestinal exhalents, so as to diminish the bulk of the circulating mass, and to lower excitement. The fourth is to lessen the determination of blood to particular parts by employing a purgative to produce the effect of a counter-irritant.

Cathartics are employed advantageously in many fevers; thus, when fevers depend on morbific matter, it is necessary they should be expelled, and this is often effected by purgatives: cathartics are supposed to have the power of cutting short the attack, and certainly when there are vitiated biliary or intestinal secretions, their expulsion must be of great benefit; and in most fevers there is generally found great constipation of the bowels. Dr. Hamilton, in his work on "Purgatives," regards their utility to depend on their acting upon the whole extent of the intestinal canal, and their carrying off feculent matter rendered offensive and irritating by constipation. In thoracic inflammation, cathartics should be carefully avoided, though it is necessary that the bowels should be kept in such a condition that their regular action is not interfered with. In enteritis, purging is sometimes necessary; and instead of increasing the inflammatory action which constitutes the disease, it diminishes it by removing the hardened fæces or other causes of inflammation, by increasing the exhalation of fluids into the intestines, unloads the vessels, and relieves the diseased parts by the same process which Nature adopts. In strangulated hernia, again, after the reduction of the gut, the danger of the case is considerably lessened by unloading the gut; but at the same time much caution must be used in the agent which we employ, so that too much inflammation may not be set up. Again, in diseases of the other abdominal viscera, as the liver, the action of cathartics is most salutary; but, when the liver is attacked with inflammation, they must not be used, as purgatives add fuel to the fire; they augment the excitement and produce much mischief. The close connection between the skin and the intestinal canal, leads us readily to suggest the great benefit to be derived from purgatives in cutaneous diseases. Cathartics are generally administered in dysentery when the intestinal inflammation is not attended with much diarrhœa; the contents of the bowels acquire an acrid character, to be removed; but in these cases care must be used in the choice of agents, as drastic purgatives augment the symptoms. Oleaginous purgatives are those which are pointed

to in affections of this nature. In diseases of the brain, cathartics of the most active nature are often requisite, and it is in these cases that the croton oil is particularly useful; for deglutition is often greatly impeded, and by pouring a few drops of this agent on the tongue, all the desired effects are produced.*

The torpid state of the bowels in these cases often admits of the accumulation of great quantities of fæces in the cells of the colon, and we are required to resort to the most powerful purgatives to remove them,— at the same time their action may be assisted by enemata. In all spasmodic affections of the intestinal canal, mild cathartics, and particularly the oleaginous ones, are highly beneficial.

Again, it is highly probable that tetanus arises from some morbid irritation, which, if it cannot be traced to a wound, must be looked for elsewhere,—and where more likely than the intestines? This is borne out by the frequent occurrence of this variety of the disease in those animals which live on crude and indigestible kinds of food.

In Sir George Mackenzie's "Travels in Iceland," we are informed that in a group of islands, situated on the west coast, many of the children are cut off by lockjaw. These islands are formed of lava; the inhabitants are remarkably indolent; their food consists chiefly of salted pulmas and puffins, (very fat, oily sea-birds); they have no vegetable food. The disease therefore appears to arise from innutritious diet. In some forms of dropsical effusion, cathartics have been long relied on, but in taking this opinion, it must be remembered that dropsy is often the result of a weakened and debilitated state of the system. In such a case cathartics are inadmissible. Anasarca and ascites are forms in which they are inadmissible, and in hydro-

* In maniacal cases in the human subject, the ancients rested their chief reliance on cathartics, and the agent they employed was black hellebore, a medicine scarcely used now, except occasionally by veterinary surgeons as an external application, from its powerful stimulating character. It is particularly recommended by Mr. Stanley of Banbury.—*Vide* Morton, *Veterinary Pharmacy.*

thorax their use is by all means to be avoided, for by increasing the debility, they augment the difficulty of breathing, not only by allowing the fluid to accumulate and narrow the capacity of chest, but by generally weakening the body.

When cathartics are admissible in hydropic complaints, they should be administered on successive days; but if their curative effects be not obvious in a short time, they should be discontinued, as they will tend to debilitate the general system. During this, tonics and moderate stimulants are employed to give strength.

Every kind of cathartic has been employed for the expulsion of worms from the intestinal canal; they are well adapted for removing these parasites when they are destroyed or removed from the coats of the bowels by other means; but their continued use is more likely to foster worms than to destroy them, by weakening the intestines and increasing the quantity of morbid mucus, the nidus in which they are formed.

In almost all chronic diseases cathartics are useful, and, as is well known, also in regulating the nocturnal and diurnal discharges from the intestines, so requisite for preserving ordinary health.* The daily evacuation of the bowels is necessary to a state of health. When this is interrupted, symptoms of derangement of digestive organs and abdominal viscera occur, and when long continued, are followed by emaciation. To such, mild purgatives are beneficial. When costiveness is combined with griping from spasmodic constriction, the disease is colic. In this disease cathartics, combined with opiates, are the remedies to be applied. In intussusception, injections have been recommended, but we believe no human aid will avail, in such a case, to save the patient; gangrene supervenes, and death ensues.

* The most remarkable case of abstinence in the human subject that I know of is that of a young lady mentioned by Ponteau, who had no stool for upwards of eight years; yet during the last year she ate abundantly of fruit, and drank broth with yolks of eggs, coffee, milk and tea.

And now I close my observations on purgatives by these few lines from Pope's "Essay on Man:"—

"Thus then to Man the voice of Nature spake:—
'Go, from the creatures thy instruction take;
Learn from the birds what food the thickets yield;
Learn from the beasts the physic of the field:
Thy art of building from the bee receive;
Learn from the mole to plough, the worm to weave;
Learn from the little nautilus to sail,
Spread the thin oar and catch the driving gale.'"

THE END.

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