life by giving rest to the diseased organ, and it would be rash to act by drugs on diseased vessels."

J. Haven Emerson.

BIBLIOGRAPHY.

Siemens, Dr. Fritz: Arch. f. Psych., ix., 1879.
Howell: In American Text-book of Physiology, Philadelphia, 1901, vol. ii.
Lyman: On Sleep and its Disorders in System of Practical Medicine (Pepper), Philadelphia, 1886, vol. v.
Durham, Arthur E.: Guy's Hosp. Rep., 3d series, vi., 1860.
Smith, Fred. J.: Differential Diagnosis, Macmillan, London, 1899.
Hammond, W. A.: Sleep and its Derangements, Philadelphia, 1870.
Da Costa, J. M.: Medical Diagnosis, 9th ed., Philadelphia, 1900.
Dana, C. L.: On Morbid Drowsiness and Somnolence. Trans. Med. Soc., State of N. Y., 1884.
Gasquet, J. R.: On the Causes and Treatment of Drowsiness. Practitioner, London, 1878, March.
Boyer, Pierre: Du Sommeil dans les Maladies. Thèse de Montpellier, Nîmes, 1879.
Conner: In Ref. Hdbk. Med. Sci., vol. i., Art. Auto-intoxications.
Gilbert et Castaigne: Journ. des Praticiens, 1900, vol. xiv., Paris.
Osler, William: The Principles and Practice of Medicine, 3d ed., New York, D. Appleton & Co., 1898.
Tirard: Medical Treatment of Diseases and Symptoms, Adapted by E. Q. Thornton, Philadelphia, 1900.
Sée, Germain: Leçons sur le Sommeil, les insomnies et les somnifères. Médecine Moderne, vol. i., Paris, 1889.
Guérin: Archives gén. de Méd., Paris, 1869, ii.
Manson, Patrick: On Negro Lethargy in Allbutt's System of Medicine, vol. ii., London, Macmillan, 1897.
Gairdner, Wm. T.: Brit. Med. Journ., 1875, ii.
Sharp, N. L.: Med. Record, 1890, vol. xxxvii.
Morison, A.: Somnolence with Cyanosis, Cured by Massage. Practitioner, London, 1889, xiii.
Caton, R.: Case of Narcolepsy. Trans. Clin. Soc., Lond., 1888–89, xxii.
Matas, R.: N. O. Med. and Surg. Journ., N. S., xi., 1883–84.
Finkler, Ditmar: Influenza in Twentieth Cent. Practice, vol. x., New York, 1898.

DRUG HABITS. See *Cocaine, Opium, Chloral,* and *Insanity.*

DUBLIN, N. H.—The most elevated village in New Hampshire (between 1,500 and 1,600 feet), is situated in the southwestern part of the State, 85 miles from Boston. Although not in the White Mountain district, Dublin has a greater elevation than any resort in that region, Bethlehem being the highest with an elevation of 1,459 feet. The town lies at the base of Mount Monadnock, 3,186 feet, near which is Lake Monadnock, and possesses unusual beauty of scenery. The roads, which are good, afford charming drives. The characteristics of the climate are the purity of the air and its tonic qualities. Below are the meteorological data so far as they are obtainable:

METEOROLOGICAL DATA OF DUBLIN, NEW HAMPSHIRE.
(Temperatures in Fahrenheit scale.)

1893.	Maximum.	Minimum.	Mean of maximum and minimum.	Clear days.	Partly cloudy.
January	45°	− 14°	15.5°	13	3
February	45	− 10	17.5	13	5
March	53	1	27.0	11	9
April	61	17	39.0	12	5
May	85	32	58.5	14	5
June	86	44	75.0	10	7
July	84	46	65.0	18	9
August	86	47	66.5	16	9
September	72	37	54.5	12	6
October	70	23	46.5	10	3
November	58	11	34.5	10	5
December	51	− 8	21.5	12	7

There is no record of relative humidity, but it probably does not differ very much from that of Bethlehem, which for July, August, and the first half of September for five years was 65.8 per cent. There are frequent strong west winds, but fogs are rare.

The usual summer range of temperature is from 68° to 75° F.; the maximum, exceeding 80°, is reached perhaps once or twice in the summer. The nights are always cool. The dryness of the air is marked.

There is one first-class hotel, and there are several boarding-houses, though the predominant mode of life is the cottage one; and comfortable, even luxurious houses can be rented. There are Unitarian and Episcopal churches, also a good public library. Dublin has now become an established summer resort, and possesses many fine private residences.

The attractions are the charming excursions in the country about, mountain climbing, driving, boating, bathing, fishing, tennis, golf, and the usual social life of a large summer community. The water supply is excellent and the drainage good. The soil is sufficiently porous to absorb quickly the water after rain. The subsoil is a mixture of clay and gravel. From its elevation, from the purity and dryness of the air as well as its tonic qualities, the climate of Dublin is a favorable one for pulmonary tuberculosis. The climate is recommended also for bronchitis, gout, rheumatism, neurasthenia, insomnia, cardiac indolence, and general depression of health. From personal experience the writer can testify to the purity and exhilarating quality of the air and the beauty and charm of the scenery. In the early autumn, when the leaves are coloring and the air is crisp, outdoor life is a delight, and riding or walking along country roads affords a constant succession of delightful views.

Edward O. Otis.

DUBOISIA.—The leaves of *Duboisia myoporoides* R. Br. (fam. *Solanaceæ*). This is a large shrub or small tree of Australia and some neighboring islands. As the drug occurs in commerce, it is usually broken up into a mass of fragments, mostly from an eighth to a half-inch in length. These are brownish, smooth, and slightly shining. When entire, the leaves are from three to four inches in length by from half an inch to one inch in breadth, and are lanceolate, narrowed toward both ends, and have an entire margin. They have a very slight narcotic odor and a bitter taste. They are not very largely used, but there is a small steady demand for them, for the same uses as those of stramonium or belladonna. The alkaloids are accompanied by some resinous matter, and the accounts of them have been very contradictory. It is now generally recognized that "*duboisine,*" the principal one, is identical with *hyoscyamine* in composition and action. It has been used as a substitute for atropine in eye practice, and the drug is the equivalent, in action, use, and dosage, of belladonna.

D. Hopwoodii von Mueller, or "pituri," of Australia, contains an alkaloid, *piturine* ($C_{12}H_{16}N_2$), closely resembling nicotine. The powdered leaf is smoked like tobacco, and is said to be stimulating and supporting, like coca, kola, and other drugs. *Henry H. Rusby.*

DULCAMARA. See *Bittersweet.*

DULCIN ($C_6H_4NH_2.CO.NH.OC_2H_5$).—Sucrol, Valzin, Paraphenetol carbamide, Para-ethoxy-phenyl urea. It may be made from paraphenetidin by the action of potassium cyanate, but preferably by acting upon paraphenetidin with phosgene dissolved in toluol, the product being treated with ammonia. It occurs in colorless, shining needles soluble in 800 parts of cold water, 55 of boiling water, 25 of alcohol, and freely in ether. Having about two hundred times the sweetening power of cane sugar, Riedel employs it to replace the latter in the diet of diabetics. It is also used to sweeten bitter or otherwise unpleasant pharmaceutical preparations.

W. A. Bastedo.

DUNCAN SPRINGS.—Mendocino County, California.

POST-OFFICE.—Hopland. Hotel and cottages.

ACCESS.—Viâ San Francisco and Northern Pacific Railroad to Hopland station.

The new hotel is located on a picturesque knoll, half a mile from the station. The springs are found on a hill 250 feet above the valley and 1,000 feet above the sea level. The surrounding country is of a rough, broken character, and the climate salubrious. The flow of water from the principal spring, the Duncan, is one gallon and a half per minute. There are several other springs,

known as the "Seltzer," the "Iron," the "Borax," and the "Sulphur" springs, their names indicating in a general way their character. The following analysis by A. W. Thatcher shows the mineral ingredients of the principal spring:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Magnesium bicarbonate	90.11
Magnesium chloride	1.41
Magnesium sulphate	1.64
Calcium bicarbonate	15.64
Silica	6.94
Potassium bicarbonate, Sodium bicarbonate	2.37
Total solids,	118.11

Free carbonic acid gas, 36.57 cubic inches.

The waters are said to be much sought after in the treatment of rheumatism, dyspepsia, and constipation.

James K. Crook.

DUODENO-CHOLECYSTOSTOMY. See *Gall-Bladder.*

DUPUYTREN'S CONTRACTION. See *Hand and Fingers.*

DYNAMOMETER.—The word dynamometer, derived from *δύναμις*, force, strength, and *μέτρον*, a measure, is used to denote an instrument for measuring strength or force. This may be either mechanical, muscular, or even physical. As applied to medical science, however, dynamometers are used chiefly in two ways: (1) To determine and regulate the strength of forces applied to the human body; (2) to measure the amount of strength or force which can be exerted by the human body, or various portions thereof, under various conditions. More particularly are these instruments used to determine the force of contraction of certain muscles, or groups of muscles, as the flexors of the fingers and thumb in measuring the force of the grasp of the hand, or of the muscles concerned in pushing or pulling in different ways. Less commonly they are susceptible of employment in determining resistances in which not only the muscles but the firmer and more solid parts of the organism are involved.

The earliest direct attempt to estimate the human strength for scientific purposes seems to have been made by De La Hire, who in 1699 published his "Examen de la Force de l'Homme," in the "Memoirs of the Academy of Sciences" at Paris. He determined the strength of men from their ability to lift weights and carry burdens, and compared it with that of horses.

The first instrument, however, which was directly used for this purpose, and to which the name of dynamometer was given, was invented by an Englishman named Graham; but it did not obtain notoriety until attention was drawn to it by Desaguliers, who in 1719 published his work on "Experimental Philosophy." The latter was a Frenchman by birth, but came early to England, and was made professor at the University of Oxford. He modified Graham's machine in various ways, and thus produced a machine of his own.

His machine, or rather machines, because different ones were required to test different muscles, consisted practically of a large wooden frame and stout uprights to afford points of support or resistance, and handles attached to a crossbar which moved a steelyard. By hanging weights on the latter the force used could be directly determined. Desaguliers decided from his investigations that five Englishmen were equal in strength to a horse, while it required seven Frenchmen or Dutchmen to furnish the same force.

These instruments were, however, too unwieldy and cumbersome to be used outside of the laboratory, and being also somewhat expensive they fell rapidly into disuse and were forgotten. Meanwhile Leroy, like De La Hire, a member of the French Academy of Sciences, proposed an instrument which consisted simply of a metallic tube, within which was placed a spiral spring with an attached graduated rod terminating above in a globe. This was to be grasped by the hand, and the spring compressed from above, the amount of force exerted being marked on the rod.

In 1807 Régnier first described his dynamometer. This consisted principally of an elliptic spring of metal, to which was attached a dial furnished with two rows of figures and with two hands, one for each row. The dial was so arranged that the hands were moved by any change in the form of the spring, and the force of either tension or pressure could be easily measured. The two rows of figures corresponded to the effects produced by action on the instrument according as the force was applied in the direction of the long or in that of the short axis; the upper row in myriagrams corresponding to the former, the lower row in kilograms to the latter. This instrument was the first dynamometer of practical value, and most of those in present use are more or less varying modifications of the same type. As may easily be understood, it served not only to measure force as connected with the human frame, but also the strength of machines, and the forces exerted or applied by them. It was first employed in surgery by Sédillot about 1836. He used it to determine and regulate the amount of force exerted in reducing dislocations and in other surgical operations. For this purpose the instrument was attached to one of the cords which extended from the pulley to the limb of the patient, and the measure of the force exerted was read from the dial. Sédillot used the dynamometer of Régnier, but the needles worked in a somewhat different manner. Instead of serving to mark the result of forces according as they were applied in the direction of the long or of the short axis, in this instrument one of the needles simply marked the *maximum* variation, while the other was freely movable and corresponded in position with the amount of the traction at each given moment, thus enabling the operator to recognize variations and to provide for continuous steady action. "He thus succeeded in producing continued extensions, that is to say, those maintained at the same strength and gradually and regularly increased."

None of the dynamometers thus far used appear, however, to have been simple or readily capable of application to medical purposes. In 1859 Burq first published his description of a new *pocket* dynamometer, "formed of the metals most active in metallotherapy." This was to serve, first, for the ready exploration of the strength of pressure and of traction in all the muscular systems of external life; secondly, for the closely approximative determination of the forces which the surgeon may be called upon to use, as in the reduction of certain dislocations; thirdly, for the more usual metallotherapeutic investigations.

Burq's dynamometer (see Fig. 1670) consists simply of a small box or case of metal, rectangular and open in front. Its upper and lower portions are, when it is not in use, maintained at a slight distance from the point of complete closure by a double spring of steel, which is so placed in the interior as to be always perfectly protected. This records accurately, on a dial placed in the centre of the case, the force of all efforts which may be made, directly or indirectly, with the hands or the feet, to close the case. When it is desired to test the force of traction, the hooks represented in the figure are inserted into openings made for them in the top and bottom of the case, and the traction is exerted by means of the handles which are attached to them below.

Another important modification in the form of dynamometers was that introduced by Duchenne, of Boulogne, and apparently first described in 1863. A little later he speaks of it thus: "I have had made a powerful dynamometer (measuring from 1 to 100 kgm.), and a sensitive dynamometer (measuring from 1 to 8 kgm.). The powerful one serves to measure the force of the pressure of the closed hand, that of all movements of parts, and the amount of what I have called nervous excitability (*irritabilité nerveuse*), or the degree of exhaustion of this excitability. First, we measure the force of pressure of the closed hand by placing in the palm of the hand, between the thenar eminence and the second phalanges of the flexed fingers, the handles of the dynamometer *crossed*. Secondly, it is designed to measure the force of

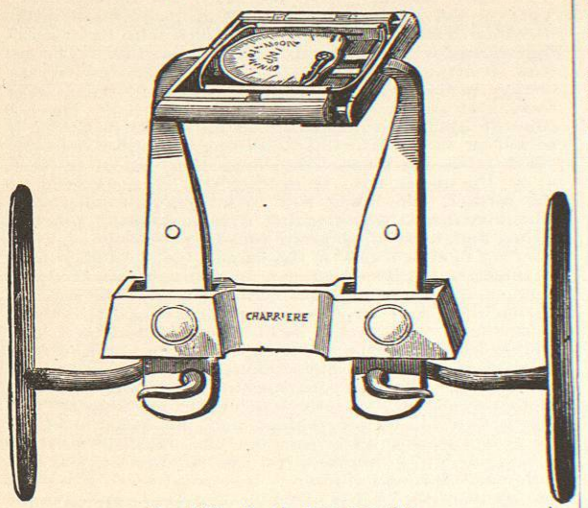

FIG. 1670.—Burq's Dynamometer.

the movements of parts. Then its handles should be uncrossed. For example, if we desire to measure the force of the movement of flexion of the lower arm, we fasten something to the end of it (a handkerchief folded crossways or a strap), to which we can attach the handle of one of the branches; then, while the subject holds the forearm powerfully flexed, the operator seizes the handle of the free branch and pulls on it until the forearm begins to extend. The sensitive dynamometer, of a form analogous to the preceding, is designed to measure in grams the force of partial movements in persons who suffer from paresis. Thirdly, the movable needles are designed to measure the force of the nervous excitability.

The instrument (see Fig. 1671) is composed of: (1) A powerful spiral spring, which ends in two straight branches (*O*, *O*) placed side by side and parallel—the spring is made tense by the separation of these branches; (2) two handles (*P*, *P*), which are fixed at will either at the extremity of the branches or near their central point, and by means of which the branches can be separated; (3) a plate (*C*), placed on the anterior face of the spring, and on which are engraved two rows of numbers (*A*, *B*), marking in the first from 1 to 100 kgm., in the second from 1 to 40; (4) a needle (*D*), which is set in movement by the separation of the branches, and marks the amount of force which causes this separation.

Dönhoff's myodynamometer was designed to "determine with mathematical exactness the degree of muscular power in disease." The instrument acts on the lever principle. A bar fifty-five inches long, with a notch five inches from one end, is so placed that the notch fits into the corner of a prism-shaped support on which the bar can be moved as a lever. The long arm of the lever contains fifty notches an inch apart, and on any of these a ten-pound weight can be suspended. The beam itself can be held in equilibrium by a two-pound weight fastened to the end of the short arm. In order to use the instrument it should, if possible, be placed on a table near which the patient sits. He presses with his right hand on the short arm of the lever, while the physician places the weight so as to neutralize the pressure. The limit of the muscular power stands at that point at which the patient is no longer able to keep down the short arm of the lever.

Among dynamometers for special purposes mention should be made of Mallez' vesical dynamometer, intended to measure the muscular force of the bladder. It is com posed of the following parts: (1) A tube 0.04 mm. long, and 0.01 mm. in diameter; (2) a little cap, which forms one of the extremities of the tube, extends into it, where it moves up and down with slight friction, and receives the shock of the column of liquid; (3) the cap is surmounted by a rod, surrounded by a spiral spring of known resistance, and this rod extends a certain distance beyond the farther extremity of the tube; (4) a pin placed on the rod at its exit from the tube is in contact with the shaft of a needle, and communicates to it the upward movements of the rod. The divisions of the dial over which the needle plays indicates the degrees of impulse, and the point of stoppage shows the measure of the greatest force developed.

All the instruments hitherto described are more or less complicated or designed for special purposes, and they are not much used at the present time. On the other hand, their place is supplied by simpler and less costly instruments. Mathieu's dynamometer, which is now in general use, is a modification of Régnier's, in which the dial, instead of projecting beyond the spring, is placed between its branches, making the instrument smaller and easier to handle. As it is intended only for medical use, the spring need be only of a moderate resistance. The dynamometer of Robert and Collin is practically the same as that of Mathieu (see Fig. 1672).

Dr. Græme Hammond, objecting to the fact that the hand of the patient sometimes covers the dial plate in Mathieu's instrument, so that the steadiness of the muscular contractions cannot readily be perceived, has, in his form, placed the dial plate at one extremity of the ellipse instead of on the side, as does Régnier. In his instrument the dial plate has the double rows of figures, which should be used on all dynamometers, and, the plate being larger and the hands longer than in the ordinary form, smaller degrees of pressure can be registered.

Hamilton's dynamometer consists of a graduated glass tube which dips into a rubber bulb. This bulb is filled

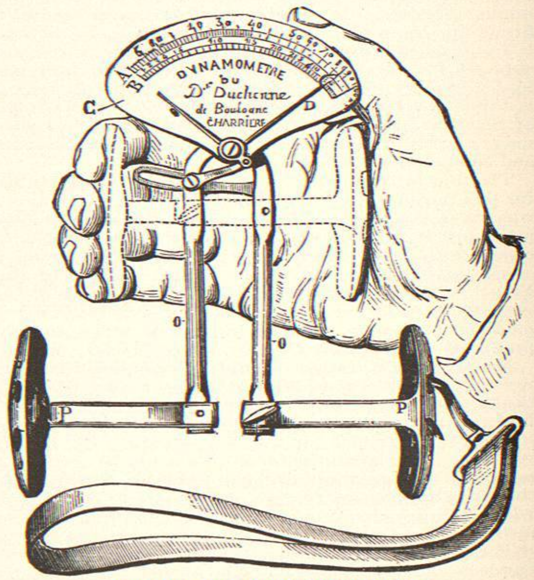

FIG. 1671.—Duchenne's Dynamometer.

with colored water, which rises in the tube when the bulb is compressed. Hamilton thinks that the rubber bulb is better adapted to receive pressure exerted by all

the flexors of the hand than is the spring dynamometer, which is acted on by only some of them.

The uses of the dynamometer, from a medical point of view, have already been indicated. In disease it is used frequently to determine the amount of muscular force in muscles or series of muscles, either by comparison of those on the one side with the corresponding ones on the opposite side, or by comparison with the standard of

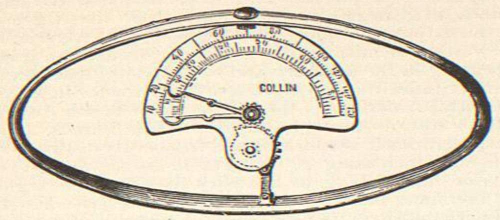

FIG. 1672.—Dynamometer of Collin.

health. It is of greatest value in cases of partial paralysis, in which it is desirable to test more or less accurately the strength of special muscles. In this way it is used as a means both of diagnosis and of prognosis. In health, also, the dynamometer has been frequently used: 1. To determine the average power which the human body can exert during a given time. Thus has been calculated the average amount of labor of various kinds which can be performed in a day. 2. As a method of selection for special duties.

In regard to the muscular power of men as determined by the force of the hand grasp, Rey gives the following table, which he obtained from the examination of seamen in the French navy or applicants for the service:

REY'S TABLE.

Number of subjects observed.	Ages.	Mean muscular power in kilo-grams.	Number of subjects observed.	Ages.	Mean muscular power in kilo-grams.
1	10.5	20.00	2	21.5	40.00
1	12.0	15.00	10	22.0	43.20
2	14.5	21.50	1	22.5	45.00
2	15.0	27.50	8	23.0	39.75
1	15.5	22.00	2	23.5	41.00
8	16.0	32.00	4	24.0	42.75
4	16.5	37.75	2	25.0	37.50
41	17.0	36.92	1	25.5	46.00
29	17.5	35.82	1	26.0	40.00
47	18.0	34.72	1	26.5	44.00
17	18.5	38.94	3	27.0	44.00
41	19.0	38.80	1	27.5	40.00
2	19.5	40.00	1	28.0	35.00
36	20.0	40.61	4	29.0	37.25
23	20.5	40.14	2	30.0	45.00
51	21.0	40.70	1	36.0	42.00

Mean between ages of 10 and 20 .... 31.54 kgm.
" " " 15 " 20 .... 35.75 "
" " " 20 " 25 .... 41.11 "
" " " 20 " 30 .... 41.25 "
" " " 25 " 30 .... 41.40 "

Mathieu's dynamometer was used. The subject standing firmly, seized the instrument in the palm of his hand, and was asked to exercise progressively the strongest pressure of which he was capable. Rey concludes that the mean muscular power of a man 19.5 years old, as measured in this way, equals 38.17 kgm. Michéa quotes Maréchal to the effect that 28 kgm. is the maximum effort that a cannonier should use to execute a manœuvre, and 21 kgm. the mean. He states that in good health a man has a power of pressure equal to 50 kgm., and a force of prehension equal to 132 kgm. A woman has about two-thirds that of a man.

The average daily work of men has been carefully determined in various ways. A table giving the results obtained may be found in the ninth edition of the "Encyclopædia Britannica," article "Mechanics."

William N. Bullard.

BIBLIOGRAPHY.

De la Hire: Examen de la Force de l'Homme. Mémoires de l'Acad. des Sciences, 1699.
Desaguliers: A Course of Experimental Philosophy, second edition, 1745.
Régnier: Thèse de Paris, 1807.
Burq: Dynamométrie médicale. Union Méd., 1859, iii., 460.
Duchenne: Bulletin de l'Acad. de Médecine, 1863, xxxviii., 919.
Dönhoff: Ein Muskelkraftmesser. Arch. d. Heilk., 1861, ii., 191.
Sédillot: Traité de méd. opératoire, third edition, 1865.
Mallez: Dynamomètre vésical. Bull. de l'Acad. de Méd., 1864, xxx., 124.
Duchenne: De l'electrisation localisée, 3d ed., 1870.
Michéa: Nouveau dictionnaire de méd. et de chir. pratiques, xi., 702.
Rey: Annales d'hygiène, 1874, xli., 86.
Hamilton: Psychol. and Medico-Legal Journ., New York, 1875, n. s. ii., 255.
Hammond, G. M.: N. Y. Med. Journ., January 17th, 1885.

DYSCRASIA. See *Diathesis*.

DYSENTERY.—HISTORY.—Dysentery was one of the best known of the diseases of the ancient world. It was noticed before the time of Hippocrates (430 B.C.), but this writer was the first to give an accurate description of its symptoms. He clearly differentiates it from diarrhœa, as the following extracts from his works show: "But when the body being heated, acrid matters are discharged, the intestine is excoriated, ulcerated, and the stools are bloody; this is dysentery, a grave and dangerous disease." "When there is dysentery, pain occupies the whole abdomen; bile, phlegm, and heated blood are discharged." From the time of Hippocrates to that of Celsus (25 B.C.–45 A.D.), the contention of schools and theorists did but little to advance medical knowledge, but the writings of the medical Cicero, as Celsus has been called, may be said to epitomize the learning and practice of his predecessors, and that the chief features of dysentery were then understood, this quotation from his works well illustrates: "The next disease of the intestines is usually called tormina; in the Greek language it is termed dysenteria. The intestines are ulcerated internally; grumous evacuations come from them; sometimes the excretions are mixed with fæcal matter always liquid, at other times the discharges are slimy; sometimes particles like flesh pass with them: there is a frequent desire of going to stool, with pain in the anus; with this pain a small portion is voided, and even by this the pain is augmented; that is relieved after some time, and then there is a short repose. The sleep is interrupted, slight fever ensues, and in the progress of time that disease either destroys the patient, when it has become inveterate, and even although it may be terminated exerts a baleful influence for a long time." Aretæus (50 A.D.) recognized, without doubt, by actual observation, that the ulcer was the peculiar and dangerous lesion of the intestine in dysentery. Matters resembling flesh, he says, come away in the discharges which accompany ulceration of the lower bowel. The flesh-like masses are shreds of the lining membrane of the intestine; healing takes place by granulation and cicatrization of the outer coat, which remains intact. That he also observed the lesions of typhoid fever, and appreciated their relation to continued and dangerous fever, is proved by the statement that, if the ulcers in the small intestine become excavated and phagedenic, acute fevers set in, which in some cases are latent and smoulder in the intestines; in other cases ardent fevers occur, accompanied by prostration of strength, thirst, anxiety, dry tongue, and small, feeble pulse.

A century later, Galen (164 A.D.) said that the physicians of his time limited the term dysentery to cases of intestinal ulceration. The shreds passed from the bowels are scrapings from the internal membranous surface of the intestine. "At first there is an excretion of very biting (*i.e.*, corrosive) bile; then shreds of the intestines follow, afterward a little blood is discharged along with the shreds, and now the affection is dysentery."