law emphasizes the fact that a sense impression is not the same when presented alone and when in connection with other related sense impressions. We cannot judge the direction of lines independently of that of

FIG. 10.

FIG. 11.

the angles whose sides they form. As a further illustration of this principle it may be shown that angles will affect the apparent lengths of lines as well as their apparent directions. If in Fig. 12 we compare the

FIG. 12.

horizontal portion of the uppermost figure with that of the lowest, it is almost impossible to believe that they are of equal length. The intermediate horizontal lines seem intermediate in length, and thus illustrate the fact that the apparent length of the horizontal lines is directly proportional to the size of the angles at their extremities. The illusion would persist if we converted these figures into truncated pyramids by adding a line parallel to the horizontal line, and would then illustrate the fact that equal lines may be made to appear unequal by the effect of the areas whose contours they help to form. A converse effect is illustrated in Fig. 13. Here the upper figure seems

FIG. 13.

larger than the lower, because its larger parallel side is brought into juxtaposition with the smaller parallel side of the lower figure. This illusion and others show especially well when cut out of paper and held against suitable backgrounds. As the figures are moved about one another the upper constantly becomes the larger. More than two figures may be used, and a variety of such contrasts may be formed.

The subject is by no means fully considered in these illustrations, nor is the explanation offered as final or adequate. If it seems to direct investigation into fruitful paths, its chief purpose will be accomplished.—*Nature*.

THE low grades of molasses made on the Louisiana plantations are now sprinkled over the dry crushed cane and materially increase its usefulness as fuel for the furnace.

THE CATTLE HORN FLY.

(*Hamatobia serrata*, Robineau-Desvoidy.)

By JAMES FLETCHER, F.L.S., F.R.S.C.

CONSIDERABLE anxiety has been evinced by stock owners in the Provinces of Ontario and Quebec concerning the sudden appearance upon their cattle of enormous numbers of a small blackish fly which irritates the animal so much with its bite and disturbs them so constantly that they fall off rapidly both in flesh and yield of milk.

This is the so-called "Horn Fly" which has attracted much attention in the United States for the last three years. It is a European pest which was first brought to the notice of the United States Division of Entomology in September, 1887, and was probably imported with cattle from Europe, where it has been known since 1830.

In 1889, its complete life history was worked out by Prof. Riley and his assistants, Messrs. L. O. Howard and C. L. Marlatt. This was published in "Insect Life," vol. ii., p. 93-103, and in the annual reports of the United States Entomologist for 1889 and 1890.

These investigations were so thorough that there was little left for later observers to discover.

Prof. J. B. Smith, of New Jersey, also worked up the life history independently at the same time and published an account of his work in Bulletin 62 of the New Jersey Agricultural Experiment Station.

Fig. 1 shows this new pest much enlarged in all its different stages of egg, maggot, pupa case and perfect insect. (The hair lines by the side of the figures show the real size.) Fig. 2 illustrates the peculiar habit this insect has of resting in large numbers on the base of the horns, which has given rise to its popular name. Both of these figures have been kindly lent by the United States Entomologist and are the same as were used in the article in "Insect Life" above referred to.

The advent of this insect into Canada was first brought to my notice by Mr. Elmer Lick, of Oshawa, Ont., on July 30 last, when he stated that it had appeared in large numbers in that section of country and was causing considerable alarm. Since that date I have received specimens and inquiries from localities ranging from the extreme west of Ontario to Boucherville, P. Q., some few miles east of Montreal. In all cases farmers seem to be thoroughly aroused and to appreciate the losses they may suffer by neglecting this pest. Exaggerated statements of losses, and injuries to the animals which are quite impossible, have received free and extensive circulation by word of mouth and through the newspapers. Cows are inaccurately said to have been killed by the flies, which, it is alleged, lay their eggs either on the horns, into which the maggots bore and then penetrate the brain, or "in holes which they eat through the hide, lay eggs therein, which hatch out in large numbers and proceed with their boring operations until the vital portions of the cow are touched and death ensues."

None of these statements are founded on fact. As stated above, the complete life history has been worked out. I had the good fortune to be in Washington, staying with Mr. Howard, in August, 1889, and was courteously permitted to join in his investigation of this matter. Together we visited some of the infested stock farms in Virginia and secured living flies and eggs from which, later on, the perfect insects were reared.

The life history is briefly as follows:

The eggs (Fig. 1, a) are laid singly on the freshly dropped dung of cattle, chiefly during the warmer hours of the day. They are $\frac{1}{10}$ of an inch in length, brown in color from the very first, and from this fact are not easily seen where laid. The young maggots hatch from the eggs in less than twenty-four hours, and at once burrow a short distance beneath the surface of the dung. Here they remain until full grown, feeding on the liquid portions of the manure. This is their only food, and all stories about their boring into the horns, brains or flesh of living animals are untrue. When the maggots are full grown, which takes about a week, they are $\frac{3}{8}$ of an inch in length, shaped as shown at Fig. 1, b, and are of a dirty white color. They descend a short distance into the ground to pupate, and the dark brown pupa cases (Fig. 1, c) are $\frac{1}{2}$ of an inch in length. During the hot weather of summer the pupal state lasts only four or five days, but the last brood passes the winter in this condition a short distance beneath the surface of the ground, and

This pest will be at once distinguished from the ordinary cattle fly by its smaller size, greater activity, and the characteristic habit of gathering in clusters upon the horns of cattle, particularly upon the upper side. When very abundant, the flies form a more or less complete ring around the horn, extending sometimes from two to four inches from the base toward the tip, as shown in Fig. 2.

The clustering upon the horns seems to be peculiar to this species, for where the common cattle fly occurs with it in large numbers upon the same animals, I have never found specimens in the thick clusters upon the horns. Neither does the horn fly, like the cattle fly, bite horses and other animals, but seems to confine its attacks to cattle. It may not be amiss to mention here that no injury whatever results from this habit of gathering on the horns, the flies merely resorting to the horns as a resting place from which they cannot be easily dislodged by the animal. They also congregate on the neck and at the base of the tail. The flies assume two characteristic positions, one while feeding, when the wings are slightly elevated and held out from the body, as shown in Fig. 1, d, the other while

FIG. 1.—THE HORN FLY.

a, egg; b, maggot; c, puparium; d, adult fly in biting position—all enlarged. (Figures kindly lent by the United States Entomologist.)

resting, when the wings lie nearly flat down the back, with the tips only slightly separated. It is in this resting position that they are always found on the horns.

Cattle of all breeds are subject to the attacks of this pest, but there is very great difference in the susceptibility to injury of various breeds and individual animals, according to their temperament and the texture of their skins. While feeding, the flies work their way down through the hairs so as to reach the skin of their victim, but they are extremely agile, and quickly take flight at the slightest disturbance. The bites seem to produce great irritation, and sores are frequently formed on the bodies of animals by their rubbing themselves against trees and other objects or by licking bitten places where the irritation cannot be allayed by rubbing, as inside the thighs and around the udder.

It is in the perfect state only that this insect is troublesome to stock; but it appears early in spring and lasts the whole season, successive broods following each other rapidly throughout the summer. Mr. Howard found that from ten to seventeen days, say two weeks, was about the time required from the laying of the egg to the appearance of the fly, and as there are about four active breeding months—from May 15 to September 15—there is time for eight generations or broods. This rapidity of development will account for the flies appearing in such large numbers as to have attracted general attention simultaneously in many widely separated localities. There is no doubt that the pest has been present on our Canadian stock farms throughout the past summer, but has only now increased in sufficient numbers to alarm the owners. Prof. Robertson, the dairy commissioner for the Dominion, tells me that he has received an unusual number of complaints this year of flies worrying stock, and these are in all probability attributable to this new importation, which, brought into the United States only six years ago, has spread in all directions over many States of the Union and is now infesting our herds in Canada.

FIG. 2.—COW HORN SHOWING BAND OF RESTING FLIES—REDUCED.

the flies emerge the following spring. The perfect insect (Fig. 1, d, male) is shaped much like the common cattle fly* or the house fly; but it is smaller, being only $\frac{1}{2}$ of an inch in length, that is, about $\frac{1}{3}$ the size of those insects.

The color of the horn fly is dark gray, with a yellowish sheen, and the body is covered with black bristles. The head consists almost entirely of the dark red, silvery-edged eyes, but bears on its lower surface the black dagger-shaped tongue which is the cause of so much torture to cattle. When not in use this is carried projecting forward in front of the head.

* NOTE.—*Stomoxys calcitrans*, sometimes called the "biting house fly," from its annoying bite and frequent occurrence in houses. The true house fly (*Musca domestica*) never bites, having only a sucking tongue.

The appearance of this insect in Canada is a serious matter, for it has been found that stock in infested regions have been so much tormented that animals fall off in condition very much, and the yield of milk is reduced in some instances from one-third to one-half. There are, however, several simple remedies which will, if attended to, greatly reduce this loss, and if all farmers would combine and use them, not only would their animals benefit in comfort, but the owners would reap rich returns for their outlay.

REMEDIES.

Notwithstanding the great loss which may result to stock owners from neglecting to attend to this new enemy, there is no reason why it should not be kept within control by simple and well tested remedies.

This, of course, will be much more easily done if by some united effort steps are taken promptly at its first appearance in a new locality. From the fact that it has appeared comparatively late in the season, and probably will not this year give trouble much longer, as it always disappears with the first frosts of autumn, farmers will have an opportunity of becoming acquainted with the habits of the pest and of learning the best remedies to be used against it, before a new season opens, and all should be prepared with the return of spring to wage a systematic, vigorous, and persistent warfare, and strive to induce their neighbors to do the same, so as to prevent its increasing in numbers and spreading all over the Dominion.

All accounts agree that the fly increases much more rapidly early in the season than later on in the year. This shows the advantage of being prepared before the pest appears with the necessary materials and beginning work promptly, so as to destroy as many as possible before breeding commences.

The remedies are cheap, simple, and easily applied; but constant attention is required to make them effective. They may be grouped under two heads:

1. Preventive, or such as prevent injury to the animals by keeping the insects from biting them.
2. Active, the object of which is the destruction of the insects either in the perfect or larval condition.

I. *Preventive*.—Under this heading I cannot do better than quote from the article by Messrs. Riley and Howard in "Insect Life," vol. ii., No. 4, which reads as follows:

"Almost any greasy substance will keep the flies away for several days. A number of experiments were tried in the field, with the result that train oil alone, and train oil with a little sulphur or carbolic acid added, will keep the flies away from five to six days, while with a small proportion of carbolic acid it will have a healing effect upon sores which may have formed. Common axle grease will answer nearly as well, and this substance has been successfully and extensively used by a large stock dealer in Virginia. Tallow has also been used to good advantage. The practice of smearing the horns with pine or coal tar simply repels them from these parts. Train oil or fish oil seems to be more lasting in its effects than any other of the substances used."

Crude carbolic acid or oil of tar mix sufficiently with fish oils if the two substances be placed together in a bottle and well shaken. They may be mixed in the proportion of 1 oz. of either in half a gallon of oil. The oil of tar has a stronger odor than carbolic acid and is cheaper.

The remedy which I think in the long run will be found to be the best is the kerosene emulsion, and when farmers have learnt how easily this very valuable remedy against the insect enemies of crops and domestic animals can be prepared, many of the pests which now give trouble will be brought into subjection.

This emulsion consists simply of a mixture of soapsuds with twice the quantity of ordinary coal oil, made as follows:

Kerosene (coal oil)..... 2 quarts.
Rain water..... 1 quart.
Soap..... 2 oz.

Boil the soap in the water till all is dissolved; then while boiling hot, turn it into the kerosene, and churn it constantly and forcibly with a syringe or force pump five minutes, when it will be of a smooth, creamy nature. If the emulsion be perfect, it will adhere to the surface of glass without oiliness. As it cools it thickens into a jelly-like mass. This gives the stock emulsion, which must be diluted before using with nine times its measure, that is 27 quarts, of water. It will be found to mix much more easily if done at once, before it cools.

The above proportions give three quarts of the stock emulsion, which, with 27 quarts of water added, make up 30 quarts of the mixture ready for use.

This may be applied to the animals either by means of a sponge or, what will certainly be found most convenient where there are many animals to treat, by means of a force pump and spray nozzle.

Prof. W. B. Alwood has found that the stock emulsion diluted ten times and mixed with one part of a water extract of tobacco waste (made by steeping 1 pound of tobacco stems in 1 gallon of hot water for an hour or more) gave almost perfect immunity for a period of three days, and that two treatments per week almost entirely relieved his cattle from annoyance. He makes the application with a knapsack pump fitted with a cyclone nozzle, and the work is done just after milking time. His method is as follows:

The animals are driven into an inclosure through a gate which will only admit one at a time. A man with a knapsack pump on his back stands at the gate and sprays one side of each animal as it passes. They are then driven out again, and the other side is treated in the same manner. The quantity of liquid thus applied is very small, but has been found sufficient. Previously, Prof. Alwood employed two men at milking time, and used one or two pints for each animal.

The knapsack sprayer mentioned above consists of a tank of 4 or 5 gallons capacity, fitted with straps for carrying it on the back, and supplied with a small force pump, a few feet of rubber hose and a spraying nozzle. These can be procured from several of the pump makers for about \$12 or \$14, complete.

Smaller and less expensive pumps would answer equally well, and may be obtained at prices ranging from \$2 to \$5 from most of our Canadian seedsmen. The following are the addresses of some of the best pump makers in the United States:

Thos. Woodason, 451 East Cambria St., Philadelphia.

Albinson & Co., 2026 Fourteenth St., Washington, D. C.

Gould's Manufacturing Co., Seneca Falls, N. Y.

The Nixon Nozzle and Machine Co., Dayton, Ohio.

Adam Weaver, Vineland, N. J.

I am not aware that any pumps of the above classes are made in Canada; but doubtless they can be obtained from Canadian agents.

Should there be any Canadian manufacturers who make spraying pumps, I shall be glad to hear from them.

II. *Active*.—Of applications to destroy the fly, a proprietary substance consisting mainly of tobacco dust and creosote, and known as "X. O. Dust," manufac-

tured by a Baltimore firm, is very highly spoken of, particularly by Professor J. B. Smith, of the New Jersey experiment station. This costs about 25 cents a pound. When placed upon the cattle by dusting it through the hair, the flies will not remain long enough on the animals to bite them. Its effects last only about two days.

Kerosene emulsion made as directed above, sprayed over the cattle, killed all the flies reached and prevented others coming, as long as the odor lasted, which was from three to seven days.

Remedies for the destruction of the perfect insects are mainly useful upon the first appearance of the pest in a new locality, or early in the season for the destruction of the first brood. The best way to fight this enemy is by the treatment of the cattle droppings so as to destroy the eggs and larvæ. The maggots can only live in the dung while it is in a moist condition. Any means, therefore, which will insure its drying up before the maggots are full grown will destroy them. For this purpose lime, land plaster, and wood ashes have been recommended, and the last named of these will probably be found the best, not only from its strong alkaline properties, which are destructive to insect life, but also from its great value as a fertilizer, and from the further fact that it is easily obtainable on every farm. If farmers could be only induced to keep this valuable material for application to their own land, instead of, as is too often the case, selling it to speculators at much less than its value to themselves, the benefit derived therefrom would much more than repay them for the trouble and expense, even without considering the use for which it is now recommended. Messrs. Riley and Howard state that: "Throwing a spadeful of lime upon a cow dung will destroy the larvæ that are living in it. If the evil should increase, it will well pay a stock raiser to start a load of lime through his fields occasionally, particularly in May or June, as every larva killed then represents the death of very many flies during July and August. We feel certain that this course will be found in many cases practical and of great avail, and will often be an advantage to the pasture besides."

I am of the opinion that Canadian wood ashes would be far superior to lime for the above purpose, and if neither of these materials was easily obtained, a good shovelful of dry earth or road dust would soon absorb the moisture necessary for the development of the larvæ.

What appears to me to be the most practical recommendation is that of Prof. J. B. Smith. He says: "By sending a boy over the pasture every other day with a shovel to thoroughly spread out the cow droppings, all eggs and larvæ would be destroyed." I believe if this were done twice a week it would be sufficient, and would be equally effective in wet weather, when the substance would be washed away, as in hot weather, when it is dried up.—*Canadian Central Experimental Farm Bulletin No. 14.*

PREVENTIVE MEDICINE RESPECTING CONSTIPATION.*

By LYMAN BEECHER TODD, M.D.

DESIRING that we keep abreast with this utilitarian age in which we live, when *cui bono* is the watchword of the hour, I purpose to consider a subject which constantly engages your attention; which severely taxes the skill and therapeutic resources of the physician and often baffles both; which meets you in your daily round of professional life; which awaits your coming, and assails you in the houses you enter, when and where relief is asked of you from troubles almost universal and always distressing, to try to prevent and to avert which is the bounden duty and desire of every conscientious physician.

Although in text books upon your library shelves preventive medicine respecting constipation is not classified among principal diseases, I nevertheless shall venture to call and to consider it a fundamental disease.

The importance of the subject of constipation, acute and chronic, is commensurate with its attendant consequences of discomfort, pain, distress, and disability. And I take it that the importance of this disorder of constipation and consequences will in your minds be greatly increased when a moment's reflection will remind you that diseases caused directly by constipation demand the services and skill of (1) the general practitioner; (2) the neurologist; (3) the laparotomist; (4) the rectal surgeon; (5) the dermatologist; (6) the gynecologist. And I doubt not but, while this enumeration was being made, cases in your own individual practice referred to one or more of these specialists have occurred to the minds of many of you, which confirm and emphasize this important appalling statement. I do not propose to weary you with minute and descriptive detail of the anatomical arrangement and construction, nor of the physiological uses and functions of the portions of the intestinal tube involved in constipation; with this you became familiar in your student's career, and have become even more so by your observation and experience as physicians and surgeons.

Constipation, as you are aware, is a condition of the bowels in which the evacuations are less frequent or in less quantity than in health, and may be temporary or habitual. Torpor of the colon is one of the most common systematic conditions of habitual constipation. Habit is one of the most frequent causes of this complaint, arising from the fact that, by means of our individual control over the sphincter ani muscle, nature has endowed us to a considerable extent with the power of regulating the alvine discharges and of resisting the solicitations of nature at inconvenient seasons, while the bowel, thus habituated to the presence of feculated matter, feels the loss of its healthy stimulation and at length ceases to be excited into action. The rectum, the lowest and largest part of the large intestines, is not constructed to retain anything for an indefinite period, but only to transmit or throw out what descends from the colon into it.

When compelled to retain hardening matter it contracts upon it, rendering it less easy of subsequent removal. At the same time the coats of the walls of the rectum through its mucous membrane will absorb

much of the watery material present. The blood becomes poisoned and the disposition of the bowel to empty itself of such impacted and hard masses is gradually lessened, thus establishing a habit of constipation.

The principal causes of constipation are neglect, improper food, sedentary habits, disease.

Symptoms: Headache, dizziness, giddiness, languor, nervous excitability, irritability, nausea, biliousness, eruption of the skin, loss of appetite.

Persons chiefly subject to this disorder are students, writers, professional and business men whose calling necessitates an exhaustive use of nerve force; those of bilious, phlegmatic temperament, whose hepatic and other glands are torpid; women who are closely confined to office work, duty in stores and manufactories, and whose hurrying to time causes neglect of nature's call. Women are more subject to constipation than men and for many and obvious reasons. Women are more careless about answering the calls of nature than men, and yet there are valid reasons why they should exercise greater care.

The mention of persons liable to and subjects of constipation suggests remedies and means of prevention and alleviation thereof. To the studious and to those of sedentary employment, exercise, regular and judicious, in fresh air, and proper diet, are absolutely required, even if change of occupation and location should become necessary. Lord Palmerston formulated this idea in a very happy manner when he said that he "considered the best thing for the *inside* of a man, especially the bowels, was the *outside* of a horse." This seems imperative when we consider the consequences or neglect thereof, viz., inflammation, prolapse, and paresis of the bowels, creation of piles and hemorrhoids, tendency to produce hernia by straining or forcing an evacuation, intussusception, fissure both in adults and in children under two years.

The collection of hardening material in the intestine becomes so impacted that urgent measures and painful and dangerous surgical operations are required to remove the same. And from constipation and its attendant evils and distress none are exempt. It respects and spares no age, race, nor class nor condition in life, claiming as its victims those of all years, from the infant in the cradle to decrepit old age. Time and the proprieties of this occasion permit me to touch only the tops of things, and to indicate important points, and to make suggestions which most probably you anticipate and appreciate.

This paper, brief and imperfect as it is, is presented with an abiding conviction that the subject of constipation in relation to, indeed productive of, abnormal and diseased conditions of female organs has not received the attention from physicians which its importance deserves and demands. It is slighted by lecturers in our schools; it is omitted in text books; it is crowded out of the journals, and passed by inconsiderately by ourselves.

Root, in *Southern Medical Record*, calls attention to constipation as a frequent factor in pelvic diseases in women. The habit of constipation is largely due to carelessness, especially in childhood. In the adult female constipation is very frequent, and many of its symptoms point to pelvic disease; pain in the back, pain in the top and back of the head, a feeling of weight in the limbs, dysmenorrhœa and leucorrhœa, subjecting the patient to local treatment, when changes in the mode of life, with relief of constipation, would restore health. It is also very evident that this disease acts as a most active factor in the production of pelvic disease in women; for where endocervicitis and even retroversion exist, rapid improvement is made as soon as constipation is relieved. Pelvic disease results from constipation through pressure and keeping up a constant condition of sluggishness of the pelvic circulation, amounting practically to a chronic congestion. Many cases of pelvic disease can be cured by the proper regulation of the bowels, and he cites cases in proof of this statement.

Two years ago there appeared in the *London Lancet* an able and very instructive article upon this subject from the pen of the eminent Sir Alfred B. Garrod. And a late number of the *Archives Kinderheil-Kunde* contained a learned and practical paper covering a wider sphere upon this subject from Professor A. O. Karnitzky. Leucorrhœa is, according to Dr. Louis Bauer, often due solely to constipation; hence clearance of the bowels of their fecal contents is in many cases the chief and most effective treatment of that troublesome disorder.

Dr. Robert A. Murray read a paper at a recent meeting of the New York Academy of Medicine: When he considered the intimate anatomical connection between the rectum and the genital organs, it would not seem strange that disease in one should cause disease or symptoms in the other.

Constipation, while not exactly a disease, was present in a large proportion of the cases which came under the care of the gynecologist, and was the cause of much trouble. The first symptom present in most cases was pain in the left side, over the region of the ovary, then flatulence and constipation. By recalling the anatomical relations, one could rapidly understand why the patient should have the pain in this region. The rectum lay on that side, the ovary and tube were almost in contact with it, constipation gave rise to congestion of the pampiniform plexus and vessels in the neighborhood. To relieve engorgement of these veins it was necessary to empty the rectum. The only apparent solution of posterior displacement in many virgins was pressure during defecation when there existed chronic constipation. Relieve the pressure by correcting the constipation, and the patient ceased to complain. In long-continued obstruction to the pelvic circulation caused by chronic constipation and uterine displacement, we found hemorrhoids and an inflamed condition of the lower gut. Cathartics in these cases were likely to cause greater suffering by renewing inflammatory symptoms; relief would not be experienced until the communication between the genital and portal circulations had been made free: (1) by replacing uterus; (2) by use of rectal enemata.

In virgins chronic constipation also often caused a dragging and falling sensation in the pelvis, by giving rise to congestion and varicosity of the vaginal and uterine veins, and led in time by such congestion, and by the pressure forward of the distended gut against the vagina, to retroversion and prolapsus. In this

* Read at the thirty-seventh annual meeting of the Kentucky State Medical Society, May, 1892.