tenth its present value, the consumption would probably not be doubled. On the other hand, every slight decrease in the price of candies, cameras or jewelry is reflected in increased consumption.

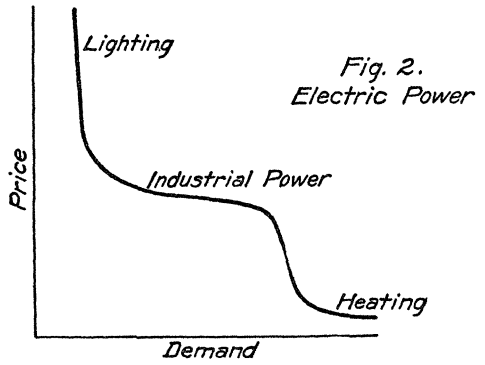

Fig. 2. Electric Power

Many market curves show a pronounced shoulder at certain price levels. Electric power (Fig. 2) is a case in point. The demand for electricity for lighting is not sensitive to price. Electricity for industrial power is in rapidly increasing demand at prices below 5 cents per kw. hr. The electrochemical industries require a still lower rate (0.5 to 2 cents) before extensive use begins. Finally at rates below 1 mill per kw. hr. an almost unlimited demand would arise for electricity for heating. Obviously a small depression in price near a shoulder of the curve would result in a greatly increased volume of business and in profits.

It may be noted that the mathematical form of these curves is roughly that of a hyperbola, $xy =$ constant. Hence if the price is in, say, dollars per pound and the consumption (demand) is in pounds, the product dollars per pound times pounds is dollars, and is roughly constant, independent of both price and demand. It follows, therefore, that if the market chart for a commodity approaches a hyperbola in form, the market will absorb a fairly constant *value* of that commodity, irrespective of either price or demand.

The *slope* of any price-demand curve is evidently a measure of the *stability* of the market for the commodity in question. The market for coal is relatively very stable, while that for luxuries is more sensitive to price changes, but not susceptible to breaks, since the slope is nearly uniform. On the other hand, the market for electric power is very sensitive to price changes at certain price levels where the slope is nearly parallel with the demand axis. In mathematical terms, the derivative of the curve is a measure of the sensitiveness of the market.

Other interesting deductions suggest themselves to one versed in mathematics. For example, let dD/dC represent rate of change in demand with change in cost, *i.e.*, the slope of the demand-cost curve. Let dC/dS be the rate of change of price with supply, then dD/dS, the rate of change of demand with supply is the product of the above ratios, $dD/dS = dD/dC \times dC/dS$. This ratio is evidently a measure of the degree of *saturation* of the market. If supply just balances demand the ratio $dD/dS = 1$. At the shoulder of the electric power curve (Fig. 2) dD/dC may be as high as 10. If now the supply-cost curve were smooth, a ratio $dC/dS = 1$ would be reasonable and therefore $dD/dS = 10$. The interpretation of this is evidently that the market for electric power can only be stabilized by making the cost-supply curve similar in form to the cost-demand curve. This is done in practice by establishing higher rates for service involving greater installation and maintenance costs. This note is intended merely to call attention to some simple applications of higher mathematics to market analysis. The viewpoint which it provides is believed to be new and has already proven useful in certain limited fields and may well be of service in other fields.

P. G. NUTTING

WASHINGTON, D. C.

TWO FATAL CASES OF POTATO POISONING

THE common white potato, *Solanum tuberosum* L., has long been regarded as poisonous, although the toxic principle, the alkaloid *solanin* ($C_{52}H_{93}NO_{18}$) seems to be confined to the green parts of the plant.

Reports of stock losses due to eating either the tops or the tubers that have turned green after exposure to light, are not rare. In one case, 64 cows became ill and exhibited symptoms of poisoning after eating liberal quantities of potato tubers, an Iowa veterinarian reports the poisoning of a cow due to eating potato parings, Chesnut and Wilcox of the United States Department of Agriculture record the loss of six pigs due to eating sprouted, uncooked potatoes, while the writer investigated a case in southern Indiana in which thirty chickens died shortly after eating a large quantity of green potato sprouts. Macfadyen demonstrated that old sprouted potatoes are poisonous to horses.

Reports of human potato poisoning are comparatively rare. According to one account 56 soldiers in Berlin were seriously affected several years ago with potato poisoning, but all recovered when the feeding of the potatoes was stopped. Pammel states in his "Manual of Poisonous Plants" that some persons can not eat potatoes because poisonous to them, and further remarks that the water in which potatoes have been boiled contains a poisonous substance. County Agent Fred I. Hoover of New Albany, Indiana, informed the writer that the illness of a family of five

members in Floyd County, Indiana, was attributed to potato poisoning.

Since there is little specific data available regarding human potato poisoning, an account of two recent deaths after eating greened potatoes may be of interest. About October 15, 1924, James B. Matheney, of Vandalia, Illinois, gathered about one and one half bushels of tubers from a patch of strawed potatoes. The tubers were distinctly green, due to having been exposed to sunlight following the scattering of the straw by chickens. On October 18, the family started to use the greened potatoes and two days later began to show symptoms of poisoning. All members of the family, consisting of father, mother, two daughters and five sons, were ill with the exception of the father, who did not partake of the tubers, and a child of 18 months, who lived on milk almost exclusively. The mother, aged 45, died on October 25, while a daughter, Cynthia, aged 16, died two days later. The other five members of the family recovered.

Altogether, six physicians worked on these cases. Two diagnoses were made, milk sickness and potato poisoning, but the milk sickness theory was eliminated when it was shown that the two heaviest users of milk, the father and 18-months-old child, were not affected, while the mother, who died, never used milk or dairy products, with the exception of an occasional teaspoonful of milk in her coffee and a small amount of butter. Furthermore, the four cows in the pasture exhibited no symptoms of white snakeroot poisoning even after having been violently driven. In addition, the characteristic breath odor of milk sickness was absent. No wild berries, nuts, etc., had been eaten. The evidence seemed clear that the deaths of the mother and daughter were due to potato poisoning as a result of eating greened tubers.

The symptoms were described by Dr. Walter D. Murfin, of Vernon, Illinois, one of the attending physicians, as follows:

> The symptoms of all were nearly the same. The first symptom was epigastric pain, which increased in severity until nausea and vomiting ensued, which began from one to two hours after the pain started. After emesis of the stomach contents and bile, the vomiting ceased and there was but little pain. All were constipated except the fourteen-year-old boy who exhibited mild diarrhoea. There was no fever; the temperature was 97.4 to 98.4. The pulse was normal. The expression was dull, while the patients were apathetic, indifferent and extremely exhausted. Two were restless before exhaustion began. One was extremely thirsty, the others did not crave water. The respirations were extremely difficult and accelerated but not of the Cheyne-Stokes type. No particular odor to the breath. Weakness and prostration were marked. Consciousness was retained by the two who died until within three or four hours of death. No convulsions. Examination of the chest, abdomen and reflexes was negative.

These symptoms agree in several particulars with the symptoms described in the case of 56 Berlin soldiers previously mentioned. Briefly, these symptoms were headache, colic, nausea, diarrhoea, general debility, vomiting and acute gastro-enteritis. The majority were drowsy and apathetic. Several victims fainted and a number showed rise in temperature to 103° F.

ALBERT A. HANSEN
PURDUE UNIVERSITY

SO-CALLED SALMON POISONING OF DOGS

THE question of whether or not salmon is the cause of a disease of dogs is an old one in the Pacific northwest. The findings in studies now in progress are considered of sufficient importance to be reported.

A number of dogs developed typical symptoms and died after eating "sore-back" salmon. This is a popular term which applies to the mature fish that are found in fresh water streams during the spawning season. The spawned salmon undergo tissue degeneration which results in discoloration of the skin. They die after reaching fresh water.

Salmon which was caught in salt water was fed to dogs. No symptoms developed in these dogs.

A small trematode has been found in the intestinal tracts of dogs that died after eating "sore-back" salmon. Large numbers of these parasites and their eggs have been found accompanied by a severe inflammation of the intestines. This trematode is a fluke, but has not yet been identified.

Microscopic cysts have been found in the muscles of the "sore-back" salmon used in this experiment. It is logical to infer that these cysts may be one of the intermediate forms of the mature fluke found in the intestines of affected dogs.

Further work with the life cycle of this parasite will be attempted. Work will also be continued on various other phases of this problem.

C. R. DONHAM
OREGON AGRICULTURAL COLLEGE
AND EXPERIMENT STATION

SCIENTIFIC BOOKS

An Introduction to the Theory of Optics. BY SCHUSTER AND NICHOLSON. *A Treatise on Light.* BY R. A. HOUSTOUN, 2nd edition.

A PERUSAL of these two books is highly educational, not only because of the store of information they