and devise tools from available materials. He did not, however, get suggestions for the particular tools constructed.

While a goose was being dressed in the kitchen, Julius found that the "wind pipe" of the bird could be used as a water hose, and caused water to flow through it into a water basin. Later he blew through it and produced a hissing sound. He then stripped off the outer tissue, bored a hole through the side of the tube, and there was a primitive flute. It was possible to produce a flute from the wind-pipe only because it had first been used for water. Julius noticed this relationship.

From the same goose, Julius also made a primitive type of ornament. He noticed that the breast bone resembled somewhat a face, and immediately made of it a mask.

Among the boy's other inventions were a milling stone in which he ground the kernels of hazelnuts, a flint scraper for removing bark, a tomahawk which during peaceful times served also as a hammer, a spear, and a snail shell pendant for a feather garland. Snail-shells were used as pendants during the Stone Age.

A suggestion of how primitive man may have bound up wounds is found in another invention. Julius, while gathering some wood shavings, injured a finger. He moistened the thinnest of the shavings to bind the wound.

Science News Letter, March 4, 1933

MARINE BIOLOGY

Fish of Different "Feather" Often Flock Together

See Front Cover

GAME HERDS of the African veldt have long been a marvel to travellers because of the extraordinary variety of animals seen together: zebras, gnus, antelope of many species, even elephants and ostriches, mingling in a wonderful patchwork quilt of moving life. Only lions and other predatories are outsiders to this Assisian fellowship.

So also it is in the gentle waters among the corals in the warmer seas. In the photograph reproduced on the cover of this issue of the SCIENCE NEWS LETTER two species of fish of the Florida coral beds are seen as peaceful companions: yellow goatfish above, yellow grunts below, like a herd of antelope with a couple of zebras as volunteer additional members. The photograph was taken by Dr. W. H. Longley of the Carnegie Institution of Washington.

Science News Letter, March 4, 1933

MINING

Known Oil in Ground Equals Petroleum Already Produced

Engineers Expect Oil and Gas Consumption to Continue Increase and Use of Coals to Decrease Slightly by 1950

THE PETROLEUM that engineers know lies beneath the ground ready to be extracted just about equals the total world production of oil to 1933.

The world's proven oil reserves are estimated at over 24 billion barrels, Valentin R. Garfias of New York City told the American Institute of Mining and Metallurgical Engineers. The world production to date aggregates nearly 23 billions. About 61 per cent. of the proven oil reserves are located in the American continent and close to 33 per cent. are in the Near East fields of Russia, Iraq and Persia.

"The United States with proven reserves estimated at 12 billion barrels, or 48 per cent. of the world's total, and with 65 per cent. of past production easily outranks other countries," Mr. Garfias said. "But these reserves, important as they are, when compared to the probable future consumption in the United States are far from impressive. In fact, our proven reserves will prove inadequate to meet demands for more than a few years without a pronounced falling off in demand.

"On the contrary, the very limited oil consumption in Persia, Venezuela, Rumania, Colombia, and Iraq will necessitate the marketing outside these countries of the bulk of their reserves, which aggregate 7.6 billion barrels. As a result, and although the Persian and Colombia fields are now practically under unit control, and their output may be to some extent regulated in line with demands, those in Venezuela, Iraq and Rumania will continue to be, in varying degrees, potential sources of instability in the world's oil trade."

Mr. Garfias' figures did not consider estimates of probable and possible oil reserves and covered only the world's oil that remains underground in producing fields and their logical expansions.

Oil and Gas Survey

Oil and gas will have increasing use as energy sources in the United States and by 1950 they will account for nearly half of the expanded fuel requirements of the nation.

A forecast of the relationship between coal and petroleum in the future and a survey of future energy requirements was presented to the Institute by Prof. W. Spencer Hutchinson of the Massachusetts Institute of Technology and August J. Breitenstein, Ashland, Pa., engineer.

In 1950 it is estimated that 499,500,000 tons of coal will be used compared with 517,018,000 tons in 1930. The situation is reversed for petroleum, with 1,419,000,000 barrel consumption predicted for 1950 and 868,484,000 barrels consumed in 1930.

Total energy per capita demanded in the United States shows a consistent growth, the engineers were told, and it increased at a faster rate than the population. Chief sources of energy today are the mineral fuels, coal and petroleum, which between them account for more than 90 per cent. of the demand, with waterpower supplying only 10 per cent.

Less Power from Coal

A marked change has occurred in the relative proportion of energy obtained from coal and oil. Only 30 years ago 91 per cent. of the country's horsepower came from coal, and only 4 per cent. from oil and natural gas, but in 1930, horsepower from coal had dropped to 60 per cent. while the proportion furnished by oil and gas had risen to 31 per (*Turn to Page* 140)

ASTRONOMY

Comet Not to be Seen With Unaided Eye

PELTIER'S comet, discovered by an Ohio amateur astronomer, will not become visible to the unaided eye. A parabolic orbit solution made at the University of California shows that the comet made its closest approach to the earth on Feb. 25.

Science News Letter, March 4, 1933

NUMBERS, *one* and *sixty,* serve in this view to define, or to describe, the *length and direction* of the new or constructed line BC; at least if the latter number (sixty) be combined with the consideration of a certain *hand,* or *direction of rotation,* towards which the old line BA may be conceived to *turn,* in the plane of the triangle (or of the paper), as indicated by the *curved arrow* in the figure.

(7) The foregoing view, although not precisely the same with that adopted by Euclid himself, in his exposition of the elements of geometry, is at least consistent therewith; and has been made the basis of an important and modern method of calculation, respecting *directed lines in one plane,* which seems to have been first introduced about the commencement of the present century, by Argand in France, and for which Professor De Morgan of London has lately proposed the name of *Double Algebra* because it recognizes and employs *two numerical elements* (such as the numbers 1 and 60 in the foregoing example), as required for the joint determination of the *length and direction of a straight line.* And it is now to be shown what is the nature of the passage that has been made, by the author of the Lectures on Quaternions, from such a *double system* of algebraic geometry, to what may be called, by analogy and contrast, a *quadruple system* of calculations respecting directed lines, or a system of QUADRUPLE ALGEBRA.

(8) This passage from the one system to the other may be said to consist mainly in the consideration of the *variable plane of an angle.* If, after tracing the equilateral triangle ABC on a *card,* which at first rests on a horizontal *table,* we then lift up that card, with the figure traced thereon, and lay it on a sloping *desk,* the triangle in its new position takes also a *new aspect;* it faces a different *region* of space, and may be conceived to *look at,* or be looked at by, a *new point of the heavens,* which is *not now* the *vertical* point (or zenith), as before. This *new aspect of the figure,* or of the *plane* (or desk) on which it is now situated, is the *new circumstance* introduced, in the transition from Double to Quadruple Algebra. And in fact it is easy to see that this new circumstance, of the *varied position of the figure,* namely, of the triangle, or simply (if we choose) of the ANGLE ABC, requires the consideration of *two new numerical elements.* For we have now *two new questions* to answer, or *two new things to determine*: namely, 1st, the *slope of the desk* (or inclination of the plane), suppose forty-five degrees, conducting to a *first new number,* 45; and 2nd, the *direction of the edge* (or, technically speaking, the line of the nodes), where that slope meets the table, and which may deviate from the line of north and south by any other number of degrees, suppose seventy, giving thus a *second new number,* in this case 70.

Science News Letter, March 4, 1933

The dark film which appears inside an aluminum pan when certain kinds of water are boiled in it is reported to have no effect on health, and can be easily removed by stewing apples or other acid fruits in the pan.

From Page 132

cent. By 1950 it is estimated that coal would furnish only 46 per cent. of the country's power, while 45 per cent. would come from oil and gas, and 8 per cent. from water power.

Other findings of the study by Prof. Hutchinson and Mr. Breitenstein are:

In 1930, the energy supply per capita, expressed in millions of British Thermal Units, was 73, while in 1950 it is expected to be 94.

Whereas bituminous and anthracite coal accounted for 60.3 per cent. of the total energy derived in 1930, it will account for only 46.6 per cent. in 1950.

Petroleum and its natural products, including also natural gas and natural gas gasoline, will show a marked rise. Accounting for only 31.6 per cent. of the total energy drived in 1930, they will account for 45.3 per cent. in 1950.

Water power will account for exactly the same percentage of the total energy derived in 1950 as in 1930, namely, 8.1, although the energy applied by hydro-power will be greater than in 1930.

Science News Letter, March 4, 1933

PHYSIOLOGY

Growth-Checking Substance May Control Cancer Tissue

GROWTH of tissues, stimulated by the presence of naturally occurring compounds containing the sulfur-hydrogen combination known as "sulfhydril" and designated with the chemical symbol SH, is checked by compounds containing the same combination in a partially oxidized condition. This, in summary, is the result of research by Dr. Frederick S. Hammett of the Lankenau Hospital, Philadelphia. If sustained by further experiments, Dr. Hammett's discovery will be of immense importance both scientifically and practically.

Dr. Hammett announced his discovery that sulfhydril-containing compounds accelerate growth at a meeting of the American Philosophical Society three years ago. At that time he also suggested that a growth-checking action might be expected of the same compounds in an oxidized or partially oxidized condition.

Following up this lead, one of his colleagues, Dr. Gerrit Toennies, attempted the preparation of such a growth-checking compound. He has now obtained it in a sub-oxidized sulfur derivative of cysteine, a compound present in all cells. In a communication to *Science,* Dr. Hammett says, "Dr. Toennies' brilliant success puts in our hands a compound of inestimable practical and theoretical value, the outcome from which no one can predict."

One of the outcomes which Dr. Hammett is reluctant to predict may be a hopeful new point of attack on the perennially urgent problem of cancer. Cancer consists essentially of an uncontrollable condition of growth in otherwise normal tissues. With a potent naturally occurring growth-controlling compound in hand, something may be done toward getting this unruly growth tendency in check. It is to be emphasized, however, that the work in its present stage cannot be regarded as the discovery of a cancer (*Turn to Page* 142)