

SPEED CLOCK

Modern aviation is about seven on the "clock" of present speed record summary. Eleven o'clock is about the most man can hope to do with planes of present designs, say experts.

ALTITUDE GAGE

How high can man fly with present type airplanes? The diagram above shows aircraft are now pretty near the "ceiling" around 61,000 feet.

RANGE LIMIT

Long distance airplane records (without refueling) represent the field where the most progress may be expected in aviation accomplishment. Man has yet only flown about half as far without a stop as he may be expected to travel some day.

PUBLIC HEALTH

Infantile Paralysis Cases Continue To Mount

AMERICA'S wave of infantile paralysis has apparently not yet reached its peak, figures released by the U. S. Public Health Service indicate.

Eight hundred and seventeen new cases were reported during the week ended September 11 as against 641 the previous week. More than 5,500 cases in all have been reported by state health officials since the beginning of the outbreak. Up to the same time last year, 2,019 cases had been found.

(Meanwhile in Chicago the American Medical Association, through an editorial in its *Journal* (Sept. 18) scored pub-

licity given to the current outbreak. "There has only been new emphasis on poliomyelitis and perhaps too much publicity," it declared. "Without the over-emphasis in the press the vast majority of people would not have been concerned by the few hundreds of cases among many millions of people."

No definite results of medical value can be expected this year from the use of the widely-advertised zinc sulphate spray treatment as a preventive measure, the *Journal* also declares.

"In view of the tendency of infantile paralysis to become rapidly less prevalent about the end of September and early October, the futility of starting such procedures at this time is readily apparent. If the evidence obtained this year is in any way encouraging plans for determining the effectiveness of the attempted preventive might be worked out so that something resembling a serious scientific experiment may be tried next June, July and August."

Illinois continued to lead in the reports of new cases, 130 such having been diagnosed in that state during the last week as against 106 the week before. New York showed 91 cases, Ohio 66

and Massachusetts 44. No new cases were reported in the District of Columbia, where, health officials pointed out, it is possible that cold weather may have been a contributing factor in cutting the toll of the disease. Doctors in general, however, are not agreed on any interpretation of the effects of the weather on poliomyelitis.

Science News Letter, September 25, 1937

PHYSICS

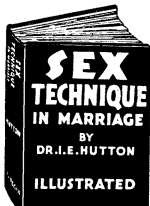
Insulin Molecule Has Complicated Pattern

See Front Cover

MATHEMATICS, physics, chemistry and X-ray studies have given Dr. D. M. Wrinch of Oxford University's Mathematical Institute the model of the complicated insulin molecule, whose atoms are arranged in a crystalline pattern. The model is pictured on the front cover.

Science News Letter, September 25, 1937

The SEX TECHNIQUE IN MARRIAGE • By I. E. Hutton, M. D.



"Dr. Ira Wile describes the book as a clear, succinct, non-emotional, authoritative and conservative exposition of the practical factors involved in making marriage successful on the sexual level. That describes the book exactly . . . It is primarily concerned with the conduct of the honeymoon and with the technique of the sexual performance."

—Dr. Morris Fishbein, Editor *Journal American Medical Assn., in Hygeia.*

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AVIATION

British Expert Predicts Speed and Altitude Limits

Theoretical Limits of Present Types of Aircraft, Practical Limits, and Present Records are Compared

THREE major aeronautical achievements within a month of one another have revived with new meaning the old question, "How far, how fast and how high can man fly in an airplane?"

Flight Lieutenant M. J. Adams of England has climbed in his plane to 53,937 feet. Three Soviet aviators have flown from Moscow to southern California, a non-stop flight of 6,338 miles. America's Pan-American Airways and Britain's Imperial Airways have successfully started a long series of test flights looking toward Trans-Atlantic commercial flying within the next year.

These men and the organizations behind them have succeeded in pushing the aerial frontier a little further away. How much further can they go? How near are airmen to the limit, if limit there be?

Here, in brief, is the present prediction of aviation experts answering this question of how fast, how far and how high a plane can go with a human being in it:

Speed: 550 miles an hour;

Altitude: 61,000 feet;

Distance: 12,400 miles without refueling.

The present world records in these three fields show, therefore, that for speed man has flown about 82 per cent. as fast as he ever will. In altitude the airplane has been pushed to about 88.5 per cent. of the "ceiling" and in distance about 50 per cent. toward the ultimate goal.

The predictions of the natural limits of human flight, here given, were made recently by one of Great Britain's best aeronautical authorities, H. E. Wimperis, director of scientific research for the British Air Ministry and president of the Royal Aeronautical Society.

Like any reliable and sane authority, Mr. Wimperis did not walk out on the limb of prediction without reservations. His predictions, he declared, applied to the present type of plane using an internal combustion engine. He allowed for invention of some totally new means

of flight, but pointed out that no such means has yet been more than hinted at.

Safest and most predictable of all the ultimates in the world's aviation records is that of speed. Using an aerial vehicle like the airplane which gets a continuous lift from the flow of air over and around the wings, scientists cannot envision a plane that will travel more than 750 miles an hour. This is the speed of sound waves. Actual practice sets the limit at a speed considerably lower than this.

The speed of sound waves and the limit for an airplane are linked because the speed at which a wave of compression in air will travel is 750 miles an hour. A sound wave is nothing but a wave of compression. When an airplane

is traveling less than 750 miles an hour, the air around the plane is compressed out of the plane's way before it gets there. If the plane, however, moves at the speed of the wave of compression or faster, the air molecules ahead cannot be "warned" or compressed out of the way, for the plane moves faster than the "warning."

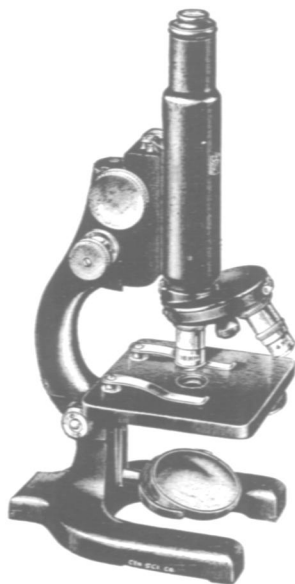
An automobile driver speeding through a crowded street faster than the sound waves from his horn, warning people to get out of the way, would be in a similar situation. Enormous friction loads, because of the abrupt collision of the air against the plane, would be developed. These friction loads, Mr. Wimperis believes, are greater than any engines, yet thought of, can cope with.

This theoretical limit is considerably lower in the stratosphere than it is at sea level. This may seem paradoxical, perhaps, to those who now live in an age when the trend to faster speeds seems to be in the high altitudes. But the answer to the paradox is that the speed of sound depends on the temperature of the air. The speed of sound falls with the decrease of temperature. At the air temperatures in the substrato-

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sphere the speed of sound is about 650 miles an hour.

For this reason Mr. Wimperis anticipates that as the speed limit is approached the record may be set at low altitudes. It is probable that records will be over 500 but less than 600 m.p.h.

Twenty thousand kilometers or 12,400 miles, a little more than half way around the earth, has been set by fuel experts as the maximum distance a plane can go on a single load of gasoline. When that point is reached, the internal combustion engine will be hauling its largest theoretical load; beyond that the present type of motor cannot be improved. This forecast, perhaps the most precarious of the lot, is based on the knowledge that for engines having given efficiency, using fuels of specific characteristics, the maximum possible ton-miles per gallon of fuel tends to be independent of altitude. Under still air conditions there is no advantage in flying higher to beat distance records.

The fact that a plane has a "ceiling" of 61,000 feet depends on another fact—that the air at 61,000 feet is so thin that supplying oxygen to the engine becomes a problem that cannot be solved with the means at our command today or likely to be in the near future.

But men may yet design means of flying totally different from those we now know and in that way achieve what appears impossible today. "By assembling this row of aeronautical ninepins," Mr. Wimperis declares, "I encourage the resourcefulness of coming generations by providing them with the zest of knocking them down."

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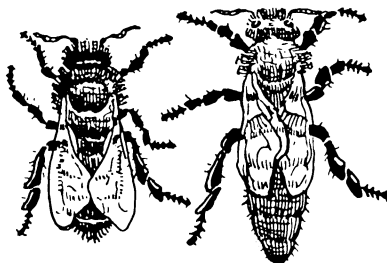
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Widows' Sons

WIDOWS' sons are proverbially drones. It doesn't matter that in human society that proverb is a libel; it sticks anyhow. But in the beehive the drones are of necessity sons of a widow. And paradoxically, even though that widow has once had a mate, her male offspring never had a father.

Queen bees are all widows. When a young queen is ready for mating, she leaves the hive and flies high in the air, with a whole flock of males in pursuit. One captures her and weds her—and pays for his success with his life, for his reproductive organs are torn from his body and he falls to earth and dies of the mutilation. The queen then returns to the hive, always to meet the deadly hostility of her mother.

If she is not killed by the jealous older queen, she founds a new colony, taking part of the old swarm with her. Within her body she has the beginnings of all the eggs she will ever lay—many thousands of them. She also has, stored in a special sac, the male germ cells she received from her departed mate. They will remain alive and able to fertilize her eggs as long as she herself lives, usually several years.

In some way, the queen is able to control the outlet of this storage sac of sperm cells, so that she can lay fertilized eggs or not as she chooses. Usually she permits the eggs to be fertilized, and those fertilized eggs always develop as females, for the male germ cell contains the particular "gene" or hereditary unit that determines femaleness in the offspring. These females become workers or queens, depending on how they are fed during the larval or grub stage.

Such eggs as the queen passes from her body without fertilizing invariably produce males or drones. Without the

"sex chromosome" of the male cell they cannot be females. Thus we have the peculiar phenomenon of bee fathers able to have only daughters, bee mothers able to have sons without the aid of fathers, but able to produce daughters only with the aid of fathers.

The paradox of the beehive does not end even here. If through some misfortune the queen dies there can be no more workers, for the queen is the only possible source of worker eggs. If there happen to be any eggs or very young larvae in the brood cells the workers can remedy this situation by feeding suitable food to produce a new queen.

But if this is not possible a strange thing happens. Some workers (which are undeveloped females, and of course unmated), begin to produce a few eggs, which they tend very carefully. But since these eggs are unfertilized they inevitably produce nothing but drones; and the poor workers are incapable of mating with them. So it is all a gesture of futility, and the colony is doomed to eventual extinction.

Science News Letter, September 25, 1937

RADIO

September 28, 5:15 p. m., E.S.T.

DISEASES OUTSIDE OUR DOOR—Dr. C. V. Akin, Chief Quarantine Officer for the Port of New York.

October 5, 5:15 p. m., E.S.T.

SALT OF THE EARTH—Miss F. E. Harris of the U. S. Department of Interior.

In the Science Service series of radio discussions over the Columbia Broadcasting System.

BULBS

THE Post Office Department has taken action against individuals and concerns located at Vogelenzang, near Haarlem, Holland, who have advertised in various American publications that they will send bulbs at a low price if money is remitted to them. Evidence satisfactory to the Postmaster General has caused him to issue fraud orders which will prevent the delivery of mail and postal money orders to such persons. Subscribers to the SCIENCE NEWS LETTER are advised not to respond to such advertisements without further inquiries in which we will be glad to cooperate. The Post Office evidence indicates that one person or a group of persons is using various names in this connection.