

PHYSIOLOGY—GENETICS

Blood That Kills

Rh anti-bodies rob some babies of life and make transfusions dangerous for some people. Science has taken steps to overcome these handicaps.

By MARJORIE VAN DE WATER

See Front Cover

► BLOOD that kills. . . . Babies robbed of the blood of life before they ever taste their first breath. . . . Mothers weakened and sometimes killed by the blood of their loved ones. . . . Children who must go through life with minds dulled or damaged. . . . Wounded soldiers that may be killed by transfusions intended to restore them to health.

This is the tragic story of Rh—blood group only recently known to science.

There is nothing poisonous about Rh blood. It is normal, healthy blood. Probably you, yourself, have Rh blood. Between eight and nine persons out of every 10 do have it. But a few persons—15 out of each hundred in the United States—do not have Rh blood.

And that is where the trouble comes, because Rh blood and blood which does not have this Rh factor do not mix well. It won't hurt you, if you have Rh blood, to have a transfusion of blood that does not have the Rh factor—Rh negative blood, it is called. A single transfusion of Rh blood won't hurt the person with Rh negative.

But after one transfusion, the Rh blood in an Rh negative person acts in somewhat the way a disease germ does to set up automatic defenses in the blood stream. So the Rh negative person starts to create a substance in the blood to kill and drive out the Rh blood.

Very Powerful

This killing substance is very powerful. If repeated transfusions of Rh blood should be given this person who has built up the anti-Rh substance, the Rh blood would literally be consumed, destroyed, the blood cells killed—completely. The dead cells then act as a poison in the kidneys of the patient. (See story on page 338)

It was not easy to see the link between this killer in the blood and the deaths of infants at birth or before birth or a few days after birth. Even after the Rh blood factor had been identified, phy-

sicians did not understand at first how it could kill infants.

It was first found in Rhesus monkeys and that is how it got its name, the Rhesus factor or Rh, for short.

For many years, a real-life medical mystery drama has been acted and reenacted. For years, medical scientists have been searching for the solution—trying to track down and identify the killer.

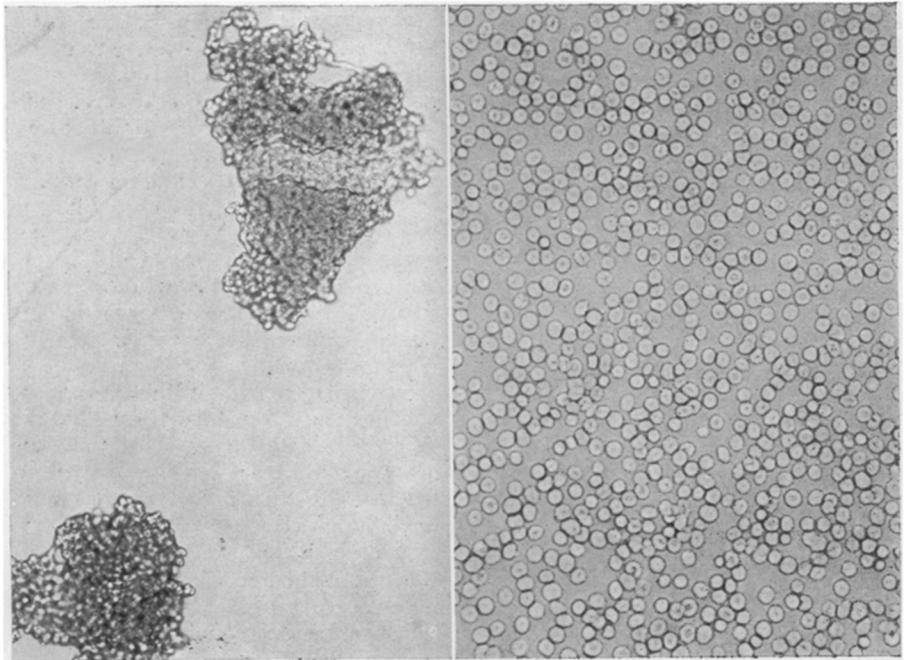
This was the plot: A father and mother have one child. Thus far, it looks as though the story might have a happy ending. But now tragedy enters; the second child dies at or before birth, or perhaps lives a matter of hours or days. There is nothing to account for the death, so the parents are still hopeful of adding to their little family. And then may follow a long series of domestic tragedies; child after child may die in the same way. Why?

Well, this was at last found to be the solution: The father, like 84 other men out of each hundred, has Rh blood. The mother has Rh negative blood. Because the Rh factor is what students of heredity know as a dominant trait, the child with one Rh positive parent and one Rh negative parent will always be Rh positive.

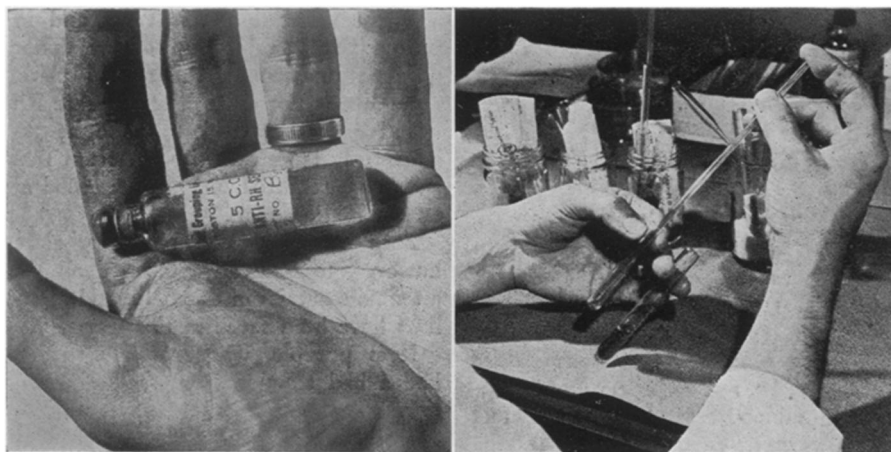
So it happens that the mother with Rh negative blood is carrying a child who inherits in its own blood the Rh positive factor. And there is a little, not much, but a little mingling of the blood of mother and unborn child.

This does not hurt the baby at first, because the Rh negative blood has nothing in it that can harm the blood of an Rh positive person. But when the Rh factor from the baby's blood enters the bloodstream of the mother, then harmful things do happen. The potent antibodies—the Rh killers—are built up in the mother's blood. And, gradually, these anti-bodies are transferred to the bloodstream of the infant.

The process goes on quite slowly. So that the first child may be safely born



FINAL EXAMINATION—After incubation and centrifuging, the blood is examined under a microscope. If the cells have clumped together (left), then the blood is positive Rh blood. If the cells show the normal distribution after the serum, then the blood is Rh negative (right). Photographs by the Army Institute of Pathology for Science Service.



TESTING FOR RH—The small vial (left) contains enough serum to make hundreds of tests to find out whether blood is Rh positive. After the blood to be tested has been diluted with salt solution, it is put in the tube with the anti-Rh serum (right). Photographs by Fremont Davis, Science Service Staff photographer.

before too much harm is done. Usually, the mother has great difficulty during the birth and may be so ill that she needs a blood transfusion. If, then, the husband comes forward as is natural and offers his blood for the transfusion, the result may be very bad for the mother. But, in general, both mother and the first child may survive.

But the anti-bodies do not disappear from the blood of the mother after this birth. They are there for three or four years or possibly even for the entire lifetime of the mother; the exact length of time they survive is not yet known. But during all the time that the anti-bodies are there in abundance in the mother's bloodstream she can never give birth to another Rh positive child. Not, that is, without the intervention of modern medical skill.

Now that the killer in this particular medical mystery is known, it is possible, in some cases, to save the baby before

the Rh anti-bodies have done their deadly work.

The baby shown on the cover of this SCIENCE NEWS LETTER in a photograph by Fremont Davis, staff photographer, lives today because of recent knowledge about Rh.

When the baby is born with blood partly or almost entirely destroyed in the condition called erythroblastosis and the normal red blood replaced by a greenish-yellow substance that makes the infant take on a jaundiced look, they give it immediate transfusions. The transfusions must be with Rh negative blood, because Rh positive would immediately be destroyed by the anti-bodies that permeate the baby's blood.

Not one, but many transfusions are given, so that the baby's blood is entirely replaced by the fresh, donated blood. So much new blood is given that the baby's blood-group is completely changed.

In modern hospitals, the physicians are prepared for the arrival of an Rh baby to an Rh negative mother, because the mother's blood is typed, not only for the better known groups such as A, B, AB, or O, but also for Rh. Professional blood donors are typed for Rh and all those who have Rh negative blood kept ready for instantaneous call in case of need.

In New Jersey, the Paterson Board of Health and the Passaic County Medical Society have founded an Rh negative blood donors club from among Rh negative mothers. In that county, it is routine for the blood of many expectant mothers to be sent to the Board of Health for Wassermann tests. At the request of



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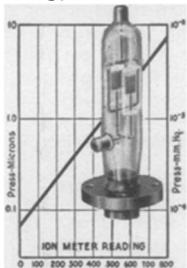
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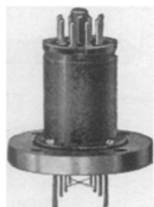
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the Medical Society, the Board has also used part of the blood sample to type it for Rh. Naturally, these expectant mothers could not be expected to give their blood right away, but their names and addresses are kept so that in the future they may be called upon for the precious and at times badly needed donations.

Typing for Rh blood factor is done in much the same way as other blood group typing except that it must be done much more carefully. It is necessary to keep the blood sample at a certain temperature for quite a long time before the clumping of the blood cells shows up the fact that the sample is not of the same type as the test material.

Although it is always a hazard for a woman with Rh negative blood to have a child if her husband is Rh positive, it sometimes happens even without any special transfusions or other emergency care that the child in such a family may live and be healthy. That is because it is possible for the child to be itself Rh negative and so its blood would not be antagonistic to the blood of the mother.

50-50 Chance

Although, by the laws of genetics, an Rh positive father would always have an Rh positive child if he inherits Rh positive genes from both his parents, about half the Rh positive fathers do carry Rh negative inheritance. Then, in spite of having Rh positive blood himself, the father has a 50-50 chance that any of his children would receive the Rh negative part of his own inheritance. This may happen, even in families that have had previous tragic loss of their babies.

The Rh negative killer does not do all its damage in killing infants, however. Those who survive may still face the danger of lowered intelligence due, perhaps, to the destruction of blood cells at the critical time before birth. Evidence pointing to this further crime is found in tests of the blood of the mothers of feeble-minded children, the implications of which are discussed in a recent issue of the *Journal of Heredity*. A much higher proportion of Rh negative mothers was found than the 15% that might be expected from the proportion in the general population.

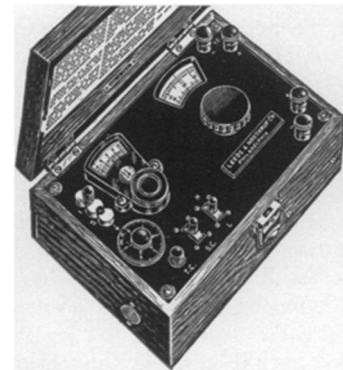
It has been suggested that all men in armed services should be typed for Rh in order to prevent danger to them through emergency transfusions. There are two good reasons why this was never done, however. In the first place, in most of the transfusions in our Army plasma

and not whole blood is used, and in plasma the blood group of the donor does not matter. In the second place, there just is not enough of the rare Rh negative blood available to make the tremendously large quantity of serum that would be required to type the blood of eleven million men.

Both the Army and Navy are alert, however, to take advantage of all the recent discoveries in this field, and many lives have been saved in this way.

It is possible, whenever a man has had a bad reaction to a blood transfusion, to type that man's blood for Rh. If he is Rh negative, then any further transfusions given him must be Rh negative blood.

Much research is still ahead for medical scientists in this field before the crimes of Rh blood can finally be prevented. Since 1941, when this blood factor was originally discovered by the scientists Landsteiner and Wiener, much ground has already been explored, but unfortunately many of the attempts to solve the problem have failed to meet success. The idea was developed that the mother's blood might be tested frequently as the anti- (Turn to page 350)



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AERONAUTICS

New French Planes

► FRANCE'S aviation industry is beginning to blossom forth, now that the Nazi war machine has been driven out by the Allies. Component parts of two airplanes were collected from their scattered hide-outs in barns and farm buildings near the Riviera.

Larger of the two airplanes is the Latecoere 631, a six-motor flying boat, with a twin tail that resembles the butterfly tail recently introduced into this country by Beechcraft. Re-erection of the plane was begun last September, and on March 6 of this year the 631 took off on its first test flight. While details of its performance are not available at present, results of the test were reported to be

excellent by the French Air Ministry, in a story appearing in *The Aeroplane*, (March 23), British aviation periodical.

The other airplane, the Bellatrix, a passenger and military transport, was completed and ready for a test flight in the spring of 1943. The German authorities refused permission to flight-test the plane, and eventually it was dismantled and hidden to keep it out of Nazi hands. The present model weighs about 24,000 pounds. Two Gnome and Rhone 1,260 horsepower supercharged engines thrust it through the air at a cruising speed of 240 miles an hour over a range of 1,240 miles. It will carry 22 soldiers and their equipment.

The production model of the Bellatrix will have a tricycle landing gear and 1,600-horsepower motors, and will weigh about 6,000 pounds more than the prototype. As a medium-range civil airliner, it can carry 23 passengers and a crew of four. It has a wingspan of more than 75 feet and the length is over 55 feet.

Due to the problem of transporting supplies and equipment over France's much-bombed rail lines, production of the new planes will be delayed. However, production of at least one prewar French aircraft is already under way. The Bloch 161 looks like the Douglas DC-3, now standard equipment on all American airlines, but has a twin tail and four engines. It is now being produced, and is

in service on French civil airlines. The four 1,050 engines give the plane a maximum speed of 267 miles an hour. The plane has a wingspan of 96 feet, 5 inches. It carries 33 passengers by day and sleeps 20 at night.

During the German occupation, French aeronautical engineers actively collected technical information from other countries, and quietly continued research work. The knowledge which they have acquired during the past five years will prove helpful to France in establishing herself after the war as a major factor in the aviation world.

Science News Letter, June 2, 1945

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bodies slowly develop and before there were enough to destroy the blood of the baby, the infant might be taken by Caesarian operation and the child's life saved. So far, this has not proved successful.

It was even suggested that the mother might be de-sensitized to Rh blood in a way somewhat similar to the way a hay-fever sufferer is desensitized to ragweed pollen. This idea is still being tested.

But knowledge of the dangers of Rh blood is itself a partial defense. If an expectant mother knows that she has Rh negative blood and that her husband has Rh positive blood, her physician is in a position now to bring all the recent discoveries of modern medicine to her aid at the time of her baby's birth.

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