a manner approximately normal ; again showing that the number of micromeres which may come from a macromere is constant, whatever the number of macromeres may be.

12. The results stated in the two preceding paragraphs show that the omission or the addition of cleavages does not alter the character or localization of the egg substances and that this localization, when unimpeded, determines the character of the cell division.

13. Isolated blastomeres undergo partial development, each giving rise only to the cells which it would form if still a part of the entire egg, but the general form of the cleavage mass is entire, *i. e.*, there is no open side.

14. A weak electric current destroys spindle fibers and astral rays, or prevents their formation and thus stops mitosis. It also destroys the polarity of the cell, prevents the separation of protoplasm and yolk, and may cause nuclei to migrate through the cell from one pole to another.

15. Abnormalities of mitosis may perpetuate themselves in subsequent divisions, even when the cause which first induced them is removed.

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Heterotransplantation of blood vessels.

By **ALEXIS CARREL.**

[*From the Rockefeller Institute for Medical Research.*]

It is well known that the tissues of an animal do not grow or grow hardly at all in an animal of another species. Nevertheless, I attempted to transplant to cats, blood vessels resected from dogs, with the aim of ascertaining whether the vessels in spite of the toxic action of the cat's blood on the dog's tissue, could take over the functions of the vessels removed.

The method consisted of removing a segment of the abdominal aorta of a cat, and of reestablishing the circulation in the lower part of the aorta by interposing a segment of the jugular or carotid of a dog and suturing it to the cut ends of the aorta.

Five similar experiments were performed. In three cases, lesions of one or two anastomoses, and thrombosis of the vessel, occurred two days, ten days and thirty-five days after the operation. However, the wall of the transplanted segment remained apparently normal. In the fourth case, the transplanted segment, extirpated and examined six days after the operation, appeared to be normal and perfectly united to the ends of the aorta. On the fifth animal, a laparotomy was performed forty-eight days after the transplantation. It was found that the pulsations were normal in the abdominal aorta and the segment of carotid. The location of the anastomoses was marked by a slight hardening of the arterial wall. No dilatation of the transplanted segment was observed. The animal was kept alive and is now, seventy-eight days after the operation, in excellent condition. The pulsations of the femoral arteries remained normal.

The experiments show merely that a segment of a dog carotid which had been transplanted in a cat could act as artery for seventy-eight days at least.

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Transplantation of the kidney with implantation of the renal vessels in the aorta and vena cava.

By **ALEXIS CARREL.**

[*From the Rockefeller Institute for Medical Research.*]

The transplantation of the kidney with implantation of the renal vessels in the aorta and vena cava consists of extirpating from an animal a kidney with its vessels, together with a patch of the aorta and vena cava; also of transplanting the kidney into the abdomen of another animal and suturing the edges of the patches to the edges of suitable openings made in the walls of the aorta and vena cava. By this patching method, the anastomoses are more safely performed than by the other methods of anastomosis. If the patch be large enough, occurrence of gangrene in the transplanted organ is practically impossible. With Guthrie, I used this method mainly on cats and obtained excellent results from the standpoint of restoration of the circulation. In dogs, on account