a recognizable plate with darkly staining chromosomes which are so clumped that even an approximate count would be impossible.

During the time development is blocked by chloral hydrate, which may amount to almost three hours, the chromosomes remain in their discrete state and do not enter a more or less diffuse "resting" stage.

The number of chromosomes in a giant second polar body formed after such a period of chloral hydrate block can be counted after the antipolar lobe has been removed with a glass needle as indicated above. It is the haploid number or possibly less. Since the eggs do not have to be sectioned with the technique used there was no chance for chromosomes to be lost. In these eggs the chromosomes were unpaired. In eggs which formed no second polar body whatever after blocking, it was possible to see approximately the haploid number of somewhat scattered chromosome pairs within the egg. Actual counts ranged from 33 to 38 pairs.

In a number of experiments the eggs which formed a simultaneous pair of second polar bodies were separated from those which produced a single giant one. Both groups were then allowed to develop as far as the first cleavage. Invariably the eggs which had produced two second polar bodies divided some little time after those which had formed a single giant one.

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COMPARATIVE OBSERVATIONS ON THE BLOOD CELLS OF SOME MOUNT DESERT ASCIDIANS

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The blood cells of Ascidians possess a peculiar interest due both to the close relationship of these animals to the vertebrates and to the fact that the orange, green and blue vanadium containing respiratory pigment found in them is almost unique in the animal world. However, Ascidian blood contains colorless leucocytes in addition to the colored cells so that the situation would seem to present a fundamental similarity to the condition found in the vertebrates. It is hoped, therefore, that a study of these cells may throw some light on the general problem of the variety and differentiation of blood cells.

As was recently pointed out by Johan Huus (1937) our knowledge of Ascidian blood cells is as yet extremely sketchy. He discusses three species, *Ascidia mentula, Perophora viridis* and *Ascidia atra (Phallusia nigra)*. Three or possibly four additional species from Bermuda have been investigated. The

most elementary questions remain unanswered. In only this half dozen species has the number of kinds of blood cells been described and in these cases almost nothing is known about the possible correspondence between a given cell in one species and a somewhat similar cell in another. Pierantoni (1923) claims that a "dorsal organ" is the site of blood cell formation in *Pyrosoma*, but nothing is known concerning the place of origin of blood cells in other Ascidians and nothing but speculation concerning the morphological changes they may undergo in the blood stream (George, 1930).

The species being used in the present investigation are all simple Ascidians which can be obtained in numbers. They have been tentatively identified as *Ascidia callosa, Boltenia ovifera, Halocynthia pyriformis* and two species of *Molgula*. Blood is easily obtained from them all.

The living blood cells were studied both while within the branchial blood vessels and immediately after withdrawing from other parts of the vascular system. Their shapes were recorded with a camera lucida. Others were supravitally stained with neutral red and Janus green and the rest stained with Giemsa's.

Each of the genera mentioned above can be readily distinguished by striking differences in the blood cells. Neither the colored nor the colorless ones are the same in any two.

The blood of *Ascidia callosa* contains many dark orange cells. The orange pigment is located in twenty-five to fifty spherical droplets which so jam the cell that there appears to be almost no cytoplasm. Also present are many cells with large green globules. The number of such cells was variable but always far fewer than those with the small dark orange droplets. There were in addition occasional small cells full of tiny orange granules.

In the *Molgula* used the pigmented cells are a bright lemon yellow and are frequently so numerous in the vessels of the plumose tentacles that the tentacles themselves appear yellow. In contrast to *Ascidia callosa*, however, the pigment is contained in several large "compartments" in the cell which thus resembles an early morula. Such so-called "morula" cells are present in *Ascidia callosa* in great numbers but are entirely colorless. Whether or not they contain vanadium as a colorless compound is as yet unknown. So far these facts support the argument of George (1930) based on treating colored cells with acids, etc., that some of the colored cells in his species are very closely related to the colorless "morula" type of cell which he found.

The blood of *Halocynthia* is poor in pigmented cells despite the bright scarlet of its tunic, which in *Ascidia atra* contains the same pigment as that found in the blood. The pigmented cells which are present in *Halocynthia* are of two kinds, those

with six or eight medium sized green ovoid bodies and those with anywhere from two to many orange-yellow globules. The *Boltenia* examined failed to show any colored cells. This may have been due to some special conditions or to a failure to look in the right part of the vascular system as it was obvious in the other genera that the distribution of pigmented cells within the vascular system of an individual is very uneven.

All the species examined possess a variety of leucocytes. That their classification presents some difficulties is indicated by the fact that Fulton (1920), George (1930) and Huus (1937) each proposes a different system. Cells belonging to all three of Huus' categories, granular, hyaline and vesiculated were present in all the forms studied with the possible exception of *Boltenia* although often in very different relative proportions. Typical "compartment" cells either pigmented or not were absent in *Halocynthia* though some "signet ring" cells were observed.

Neutral red produced a striking differentiation between the various leucocytes. Many stain so deeply that their features are obliterated. Others take up the stain to a moderate degree. Still others, in *Molgula* and *Ascidia* well over 50% remain entirely unstained. These are the finely granular cells. Both "compartment" and "signet-ring" cells react in the same way which supports the view of George (1930) based on other grounds that these two types of cells are very closely related genetically. With Giemsa's stain both basophilic and acidophilic cells are evident but their positive identification must await further work.

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FAUNAL NOTE: AN INSHORE *CERIANTHUS* AT MOUNT DESERT ISLAND

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Cerianthus americanus Verrill or a closely similar species of this large and beautiful sea anemone was found in moderate abundance just below low tide lines on a gravelly bottom on the southwestern part of the island. Previous records (Parker 1900, Carlgren 1912, Pratt 1935) as well as information obtained from Professor Ulric Dahlgren, the actinian collection in the National Museum, etc., all denote Cape Cod as the northern limit of this species which extends southward to Florida.

The individuals captured were approximately five inches long in a moderately expanded condition but were capable of much greater extension. The coloration of the tentacles showed