

Chromosomal theory of inheritance Although the relationship between chromosomes and genes was suspected at the time of Mendel's work, it was rediscovered when Weisman (1900) put forward the view that an individual's heredity endowment, carried on the chromosomes, is halved in each gamete. The chromosomes retain a morphological individuality throughout the various cell division stages that is transmitted across generations and genes show a similar continuity. Correns and Cannon both in 1902 pointed out the close parallelism between Mendelian segregation and chromosome number reduction during meiosis concluding that the genes are on the chromosomes. During meiosis homologous pairs of chromosomes are brought together and then the members of each pair segregate into different gametes independently of the members of other pairs, Mendelian genes segregate independently at sometimes prior to gamete formation. Boveri (1902) showed by his studies on polyspermy in the fertilization of sea urchin eggs that the chromosomes of an individual were not equivalent to one another, and a full complement is necessary for the normal development of the cell. In addition to establishing the relationship between genes and chromosomes, Sutton recognized that there must be non-independent assortment of some genes, otherwise, as he noted, the number of distinct characters could not exceed the number of chromosomes. During that period Montgomery (1901) showed that chromosomes occur in distinct pairs and that the synapsis involves the union of maternal and paternal chromosomes. Boveri in the same year published a paper in which he advanced many of the same ideas to that hypothesis correlating genes and chromosome transmission. The association of a particular inherited character with a particular chromosome was made between 1906 and 1910 by McClung, who showed that Hemiptera and Orthoptera females have one more chromosome than the males. This so-called X chromosome occurs in all eggs of a female but in only 50% of male sperms, so that half of the resultant zygote are XX and female, while the other half are XO and males. 2.3.4.