Pierre Grasse and the `irreducible complexity' of the blood-clotting cascade

I was reading the book "Evolution of Living Organisms" (1977) by "the [late] great French zoologist Pierre-Paul Grasse" (Gould S.J., "An Urchin in the Storm," 1987, p.234), "who for thirty years, held the chair for evolution at the Sorbonne" (Koestler A., "Janus," 1983, p.177), and of whom his opponent Dobzhansky wrote:

> "Now, one can disagree with Grasse but not ignore him, he is the most distinguished of French zoologists, the editor of the 28 volumes of `Traite de Zoologie', author of numerous original investigations and ex-president of the Academie des Sciences. His knowledge of the living world is encyclopedic ...." (Dobzhansky T.G., "Darwinian or `Oriented' Evolution?" Review of Grasse P.-P., "L'Evolution du Vivant," Editions Albin Michel: Paris, 1973, in "Evolution," Vol. 29, June 1975, pp.376-378, p.376).

when I found this:

> "Take, for example, regulation of the coagulation of blood, a highly complex phenomenon to which biologists seem to have given little thought. Its normal cause is the opening of a vein, artery, or capillaries; the blood brought into contact with the lip of the wound (damaged tissues) becomes the site of chain reactions ending in the formation of a clot. This is only possible because there *preexist* in the blood reaction agents or their precursors whose end effect is to coagulate certain proteins of the blood plasma. The organism, ready for all eventualities, bears within itself *in the latent state* its own protective system. Genes control the elaboration of coagulants, proteins, and enzymes. Such a process forms a single whole; a lack of a substance arises, an enzyme is affected, and the system will not work. One does not see how it can have been formed by successive chance effects supplying a protein or an enzyme in any random order. Besides, we know that the effects of mutations on the system are disastrous and form the lengthiest chapter in blood pathology. The system has become *functional only when all its components* have come together and adjusted themselves to one another. The Darwinian hypothesis compels us to postulate a preparatory period during which selection acts upon something that does not, physiologically speaking, yet exist. Under the necessary conditions of the postulate, the action can only have been prophetic!" (Grasse P.-P., "Evolution of Living Organisms: Evidence for a New Theory of Transformation," [1973], Academic Press: New York NY, 1977, p.152. Emphasis original).

That is, Grasse, in 1973, nominated the vertebrate blood-clotting cascade, as effectively `irreducibly complex'. Here is what Grasse wrote again: "regulation of the coagulation of blood [is] ... a highly complex phenomenon ... [Upon] the opening of a vein, artery, or capillaries; the blood brought into contact with the lip of the wound ... becomes the site of chain reactions ending in the formation of a clot. ... Such a process forms a single whole; a lack of a substance [or] an enzyme ... and the system will not work ... The system has become *functional only when all its components* have come together and adjusted themselves to one another." (Grasse's emphasis). Grasse points out that it cannot "have been formed by successive chance effects supplying a protein or an enzyme in any random order", i.e. the natural selection of random (unguided) mutations, because "the effects of mutations on the system are disastrous."