

in with a finding of others that the greatest scientists have been men who were separated ⁵⁷³ from their fathers, or estranged, like Louis H. Sullivan, the most originaive architect. Galton and Visser ⁵⁷⁴ found that the higher ranking scientists had fathers with median age 35, and more of 47+ than younger than 25.⁵⁷⁵ It seems clear that a boy who loves his parents, honors their wisdom, and strives to do everything expected of him, will grow up to be an excellent citizen, but hardly to be a creative scientist or inventor. To become that he must be one who questions the truth or sufficiency of what all others accept. It is his business to be dissatisfied with things as they are, and with knowledge as approved. Schools with especially authoritative traditions have likewise found that they produce few scientists.⁵⁷⁷ But indeed all our schools repress creativity, with their usual teaching that the only problems are those posed in the textbook, these have only one correct answer, and you had better be right (§ 609, 610).

[603] There is some disagreement about the traits of creative people. Maslow ⁵⁷⁸ names two types: Primary creativeness, which is gay, spontaneous, sociable, depends on the unconscious and accepts his own aspects of femininity ⁵⁷⁹ or weakness, contrasted with Secondary creativeness, with its taut mind, logic, caution, controlled emotion, ordered life, and repression of all weaknesses. Despite an often high IQ, this latter type is not so creative as the Primary one. Best is a combination of the two. MacKinnon ⁵⁷⁹ says, "What seems to characterize the more creative person is a relative absence of repression and suppression as mechanisms for the control of impulses and images. Repression operates against creativity . . . because it makes unavailable to the individual large aspects of his own experience."

[604] Of course we are speaking always of the usual types, and there are exceptions from every rule. Numerous other qualities are needed also for a scientific creator,⁵⁸⁰ but any one may be lacking if the rest can make up for it. Beside these qualities discussed, they need always high intelligence, probably 150-60,⁵⁸¹ education sufficient for their field, good spatial visualization, exceptional honesty, accuracy, *pertinacity*, energy, initiative, observation, curiosity, interest in picking up information over wide areas, consciousness of their own mental life, a strong ego, belief in their own density. Cattell,⁵⁸² studying the great discoverers of the past and examining 140 eminent in physics, biology, and psychology today, according to 16 standard traits of personality, found them decidedly schizothymic on average, especially the physicists, somewhat dominating, inhibited, and desurgent (untalkative), emotionally sensitive, and radical—all this agreeing with the historical and Roe findings. As Drevdahl says, "They are both introverted and bold." Rossman shows an hereditary element.⁵⁸³ Szent-Györgyi stresses the discoverers' motive of curiosity and says, "We seek not truth but new truth."⁵⁸⁴ Mellinger found the more creative engineers dislike systematic, orderly work, forget names and birthdays, are restless and fidgety, are not bothered by pressure and deadlines, but may get their best ideas then; they read widely, a prac-

⁵⁷³ It has been also noted that scientists are often eldest or only children, if not about the youngest in the few cases of a large family (N 576); or having no brother less than 4 years younger, probably because the boy must be independent. Roe, *ibid.* N 601, her p. 68.
⁵⁷⁴ Stein & Meer agree that when opportunity is held equal among research chemists, IQ-ness does not matter above the 95th percentile. N 562, pp. 170, 1. MacKinnon found their marks falling rather low in college. § 609. Getzels & Jackson stress the value of the creatives who lack highest IQ. § 609. N 602, N 595.