In his *Cours de Philosophie positive*, the nineteenth-century French philosopher, Auguste Comte, detailed a philosophy crucially dependent upon science and scientific thought.¹ In his system, human comprehension and explanation of the natural world progressed through three stages: in the first, theological stage, divine will accounted for natural phenomena; in the next, metaphysical stage, interpretations of nature took an abstract, philosophical cast; and in the final, so-called "positive" stage, scientific truth characterized the world. According to Comte, the mind reached the positive stage by moving through a well-defined hierarchy of scientific thought. At its base lay mathematics, the most complex of the sciences in his view. Furthermore, since mathematics represented a body of scientific truths, it had already reached the stage of positive knowledge and, in fact, was historically the first science to attain this goal. Upon this base rested five sciences in ascending order of their historical achievement of the positive stage and thus, to Comte's way of thinking, in order of their decreasing complexity and increasing generality. They were astronomy, physics, chemistry, biology, and, at the top, a new science for which Comte coined the term "sociology." Of these, he held that all but the essentially brand-new science of sociology had reached the positive stage by the mid-nineteenth century. He thus took it as his task not only to establish this discipline in terms of scientific truths but also to achieve the synthesis of all of the positive sciences into one complete and unified positive philosophy.

While few thinkers, especially outside of France, accepted completely the positivist philosophy as articulated by Comte, that many in England embraced at least part of his philosophical vision indicated the persuasiveness of some of his underlying tenets.² In particular, the idea of the certainty and truth of mathematics, the concept of a hierarchy of the sciences, the desire for a synthesis of human knowledge, and the notion of an inherent progress in scientific development found expression in the work and writing of many nineteenth-century scientists. By extending these precepts along Platonistic lines, some further concluded that the sciences moved toward a surer and more perfect realization as they became more highly and successfully mathematized. (Of course, the latter position echoed that of the various brands of German idealists, most notably Immanuel Kant and Friedrich Schelling.) Consistent

with this point of view, a synthesis of human—or at least scientific—knowledge hinged on its mathematization. Thus, the scientist animated by this modified positivistic philosophy of science (or modified idealistic philosophy of science, depending on the initial source of inspiration) strove to unify the sciences through mathematics. Most generally, and more consonant with Comte’s initial formulation of positivism, the unification occurred through the application of mathematics to the science, which had the additional consequence of rendering the science more irrefutable. (In the nineteenth century, the mathematical linkage of the phenomena of electricity and magnetism represented a stunning example of just such an application.) In this light, though, how could a pure mathematician participate actively in a positivistic synthesis? Clearly, since the notion of the mathematization of mathematics was tautological, one possibility was to turn Comte upside down and apply the sciences to mathematics.

As early as 12 April, 1846, that colorful, flamboyant, and eminently talented British algebraist, James Joseph Sylvester, had betrayed his positivistic—as opposed to idealistic—leanings in response to a letter from his friend, the American physicist and soon-to-be Secretary of the Smithsonian Institution, Joseph Henry. Writing to Sylvester on 26 February, 1846, Henry had mentioned his recent attempts to read some of the German metaphysicists and had "concluded to keep pretty close to positive philosophy during the remainder of [his] life."3 Sylvester concurred, writing that "I agree with you as to the preferability of Positive Philosophy—the other is well enough for an occasional excursion."4

Indeed, throughout his career, Sylvester dropped hints as to the positivistic—although by no means purely Comtian—nature of his philosophical leanings in his published works, before finally giving them their most complete expression at his hand in a speech before the British Association’s Exeter meeting in 1869.5 However, nowhere in his works did the ideals he expressed at Exeter and elsewhere receive a more explicit, technically oriented airing than in his attempt, in the late 1870s, to apply the atomic theory of chemistry to a major area of nineteenth-century research in pure mathematics, namely, invariant theory.6 As he saw it, his work successfully realized the goal of unifying these two seemingly disparate areas of scientific thought. Yet of equal importance in his view, it provided an increasingly necessary practical justification—through the linkage with chemistry—for a main branch of pure mathematics, as well as an analogy useful in rendering pure mathematical research comprehensible to a popular audience. This perceived need reflected two key consequences of the push toward specialization in the