

ADVANCED READING

PASSAGE 1

Until recently many astronomers believed that asteroids travel about the solar system unaccompanied by satellites. These astronomers assumed this because they considered asteroid-satellite systems inherently unstable. Theoreticians could have told them otherwise: even minuscule bodies in the solar system can theoretically have satellites, as long as everything is in proper scale. If a bowling ball were orbiting about the Sun in the asteroid belt, it could have a pebble orbiting it as far away as a few hundred radii (or about 50 meters) without losing the pebble to the Sun's gravitational pull. Observations now suggest that asteroid satellites may exist not only in theory but also in reality. Several astronomers have noticed, while watching asteroids pass briefly in front of stars, that something besides the known asteroid sometimes blocks out the star as well. Is that something a satellite? The most convincing such report concerns the asteroid Herculina, which was due to pass in front of a star in 1978. Astronomers waiting for the predicted event found not just one occultation, or eclipse, of the star, but two distinct drops in brightness. One was the predicted occultation, exactly on time. The other, lasting about five seconds, preceded the predicted event by about two minutes. The presence of a secondary body near Herculina thus seemed strongly indicated. To cause the secondary occultation, an unseen satellite would have to be about 45 kilometers in diameter, a quarter of the size of Herculina, and at a distance of 990 kilometers from the asteroid at the time. These values are within theoretical bounds, and such an asteroid-satellite pair could be stable. With the Herculina event, apparent secondary occultations became "respectable"—and more commonly reported. In fact, so common did reports of secondary events become that they are now simply too numerous for all of them to be accurate. Even if every asteroid has as many satellites as can be fitted around it without an undue number of collisions, only one in every hundred primary occultations would be accompanied by a secondary event (one in every thousand if asteroid satellites system resembled those of the planets). Yet even astronomers who find the case for asteroid satellites unconvincing at present say they would change their minds if a photoelectric record were made of a well-behaved secondary event. By "well-behaved" they mean that during occultation the observed brightness must drop sharply as the star winks out and must rise sharply as it reappears from behind the obstructing object, but the brightness during the secondary occultation must drop to that of the asteroid, no higher and no lower. This would make it extremely unlikely that an airplane or a glitch in the instruments was masquerading as an occulting body.

PASSAGE 2

Historians attempting to explain how scientific work was done in the laboratory of the seventeenth-century chemist and natural philosopher Robert Boyle must address a fundamental discrepancy between how such experimentation was actually performed and the seventeenth-century rhetoric describing it. Leaders of the new Royal Society of London in the 1660s insisted that authentic science depended upon actual experiments performed, observed, and recorded by the scientists themselves. Rejecting the traditional contempt for manual operations, these scientists, all members of the English upper class, were not to think themselves demeaned by the mucking about with chemicals, furnaces, and pumps; rather, the willingness of each of them to become, as Boyle himself said, a mere “drudge” and “under-builder” in the search for God’s truth in nature was taken as a sign of their nobility and Christian piety. This rhetoric has been so effective that one modern historian assures us that Boyle himself actually performed all of the thousand or more experiments he reported. In fact, due to poor eyesight, fragile health, and frequent absences from his laboratory, Boyle turned over much of the labor of obtaining and recording experimental results to paid technicians, although published accounts of the experiments rarely, if ever, acknowledged the technicians’ contributions. Nor was Boyle unique in relying on technicians without publicly crediting their work. Why were the contributions of these technicians not recognized by their employers? One reason is the historical tendency, which has persisted into the twentieth century, to view scientific discovery as resulting from momentary flashes of individual insight rather than from extended periods of cooperative work by individuals with varying levels of knowledge and skill. Moreover, despite the clamor of seventeenth-century scientific rhetoric commending a hands-on approach, science was still overwhelmingly an activity of the English upper class, and the traditional contempt that genteel society maintained for manual labor was pervasive and deeply rooted. Finally, all of Boyle’s technicians were “servants,” which in seventeenth-century usage meant anyone who worked for pay. To seventeenth-century sensibilities, the wage relationship was charged with political significance. Servants, meaning wage earners, were excluded from the franchise because they were perceived as ultimately dependent on their wages and thus controlled by the will of their employers. Technicians remained invisible in the political economy of science for the same reasons that underlay servants’ general political exclusion. The technicians’ contribution, their observations and judgment, if acknowledged, would not have been perceived in the larger scientific community as objective because the technicians were dependent on the wages paid to them by their employers. Servants might have made the apparatus work, but their contributions to the making of scientific knowledge were largely—and conveniently—ignored by their employers.

PASSAGE 3

One type of violation of the antitrust laws is the abuse of monopoly power. Monopoly power is the ability of a firm to raise its prices above the competitive level—that is, above the level that would exist naturally if several firms had to compete—without driving away so many customers as to make the price increase unprofitable. In order to show that a firm has abused monopoly power, and thereby violated the antitrust laws, two essential facts must be established. First, a firm must be shown to possess monopoly power, and second, that power must have been used to exclude competition in the monopolized market or related markets. The price a firm may charge for its product is constrained by the availability of close substitutes for the product. If a firm attempts to charge a higher price—a supracompetitive price—consumers will turn to other firms able to supply substitute products at competitive prices. If a firm provides a large percentage of the products actually or potentially available, however, customers may find it difficult to buy from alternative suppliers. Consequently, a firm with a large share of the relevant market of substitutable products may be able to raise its price without losing many customers. For this reason courts often use market share as a rough indicator of monopoly power. Supracompetitive prices are associated with a loss of consumers' welfare because such prices force some consumers to buy a less attractive mix of products than they would ordinarily buy. Supracompetitive prices, however, do not themselves constitute an abuse of monopoly power. Antitrust laws do not attempt to counter the mere existence of monopoly power, or even the use of monopoly power to extract extraordinarily high profits. For example, a firm enjoying economies of scale—that is, low unit production costs due to high volume—does not violate the antitrust laws when it obtains a large market share by charging prices that are profitable but so low that its smaller rivals cannot survive. If the antitrust laws posed disincentives to the existence and growth of such firms, the laws could impair consumers' welfare. Even if the firm, upon acquiring monopoly power, chose to raise prices in order to increase profits, it would not be in violation of the antitrust laws. The antitrust prohibitions focus instead on abuses of monopoly power that exclude competition in the monopolized market or involve leverage—the use of power in one market to reduce competition in another. One such forbidden practice is a tying arrangement, in which a monopolist conditions the sale of a product in one market on the buyer's purchase of another product in a different market. For example, a firm enjoying a monopoly in the communications systems market might not sell its products to a consumer unless that customer also buys its computer systems, which are competing with other firms' computer systems. The focus on the abuse of monopoly power, rather than on monopoly itself, follows from the primary purpose of the antitrust laws: to promote consumers' welfare through assurance of the quality and quantity of products available to consumers.

PASSAGE 4

Amsden has divided Navajo weaving into four distinct styles. He argues that three of them can be identified by the type of design used to form horizontal bands: colored strips, zigzags, or diamonds. The fourth, or bordered, style he identifies by a distinct border surrounding centrally placed, dominating figures. Amsden believes that the diamond style appeared after 1869 when, under Anglo influence and encouragement, the blanket became a rug with larger designs and bolder lines. The bordered style appeared about 1890, and, Amsden argues, it reflects the greatest number of Anglo influences on the newly emerging rug business. The Anglo desire that anything with a graphic designs have a top, bottom, and border is a cultural preference that the Navajo abhorred, as evidenced, he suggests, by the fact that in early bordered specimens strips of color unexpectedly break through the enclosing pattern. Amsden argues that the bordered rug represents a radical break with previous styles. He asserts that the border changed the artistic problem facing weavers: a blank area suggests the use of isolated figures, while traditional, banded Navajo designs were continuous and did not use isolated figures. The old patterns alternated horizontal decorative zones in a regular order. Amsden's view raises several questions. First, what is involved in altering artistic styles? Some studies suggest that artisans' motor habits and thought processes must be revised when a style changes precipitously. In the evolution of Navajo weaving, however, no radical revisions in the way articles are produced need be assumed. After all, all weaving subordinates design to the physical limitations created by the process of weaving, which includes creating an edge or border. The habits required to make decorative borders are, therefore, latent and easily brought to the surface. Second, is the relationship between the banded and bordered styles as simple as Amsden suggests? He assumes that a break in style is a break in psychology. But if style results from constant quests for invention, such stylistic breaks are inevitable. When a style has exhausted the possibilities inherent in its principles, artists cast about for new, but not necessarily alien, principles. Navajo weaving may have reached this turning point prior to 1890. Third, is there really a significant stylistic gap? Two other styles lie between the banded styles and the bordered styles. They suggest that disintegration of the bands may have altered visual and motor habits and prepared the way for a border filled with separate units. In the Chief White Antelope blanket, dated prior to 1865, ten years before the first Anglo trading post on the Navajo reservation, whole and partial diamonds interrupt the flowing design and become separate forms. Parts of diamonds arranged vertically at each side may be seen to anticipate the border.