

Marine Archeology: Troubled Search for Spanish Treasure Ship

Key West, Florida. On 5 September 1622, at the height of the hurricane season, the annual Spanish treasure fleet set sail from Havana, laden with some 100 tons of gold, silver, emeralds, copper, and indigo from Spain's possessions in Mexico and South America. Two days later most of the fleet lay wrecked somewhere along the Florida Keys, the chain of coral islands that arcs from Key Biscayne, just off Miami, down to Key West.

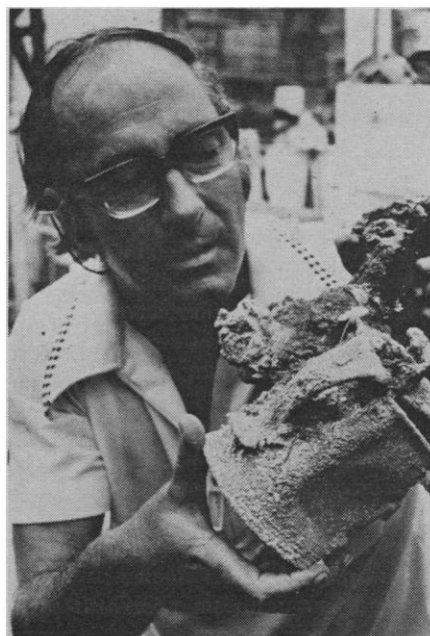
The fleet of 1622 is one of the richest of several Spanish treasure fleets known to have come to grief along the Florida coastline. Ten years ago treasure hunters using modern methods started searching again for these fabled fleets. A syndicate calling itself the Real 8, in partnership with another company, Treasure Salvors, Inc., recovered several million dollars worth of treasure off Vero Beach from wrecks of the fleet of 1715.

Since the Real 8's lucky strike, underwater treasure hunting in Florida has become a minor industry, in which some salvors have found fortunes at sea but many more have lost them. The sharks and barracuda that infest Florida's seas are nothing compared with the hazards above water: salvors operate in a world of intrigue, distrust, and cutthroat competition that extends occasionally to theft and outright sabotage.

The search for the fleet of 1622 has proceeded amid charges of fraud and forgery, action by the Securities and Exchange Commission, and a dispute now before the U.S. Supreme Court as to whether Florida owns the waters in which the search is focused. Meanwhile, archeologists complain that Florida's underwater heritage is being essentially destroyed by the treasure hunters' bulldozer approach to excavation. The salvors no longer dynamite open the wrecks they find, but the Florida State Division of Archives, History and Records Management, set up to supervise the treasure hunting, has in its critics' view only slowed the rate of destruction.

The main swirl of activity in Florida's turbulent treasure hunting scene lies at present some 10 miles southwest of the Marquesas, uninhabited islands 25 miles west of Key West. Melvin A. Fisher, a salvor who says he has "sold more treasure than anyone in the history of the world," believes that on this spot he has found the wreck of the *Nuestra Senora de la Atocha*, the richest galleon of the Spanish fleet of 1622. "We have \$6 million of treasure already in, and there is \$400 to \$600 million still out there," Fisher told *Science*.

At today's prices for gold, Fisher may well be right, although he has a certain enthusiasm with figures described by his friends as the "Fisher factor." His critics doubt not only his valuation but whether he has found the *Atocha* at all. "When he talks in exorbitant terms he is talking for some starry-eyed stockholder who lives in the middle of the country and doesn't know anything about anything," says Mendel Peterson, former director of



Melvin A. Fisher examines a pewter tankard retrieved from an English shipwreck he found during the search for the Atocha. The wreck has been dated from its coinage to the period 1690-1704.

underwater exploration at the Smithsonian Institution in Washington, D.C. Robert Marx, a rival treasure hunter and former member of the Real 8 syndicate, says he can prove Fisher has not found the *Atocha* and that the artifacts recovered from the site, if indeed of the 1622 period, may be from a Spanish salvage vessel.

Fisher centers his case on three silver bars discovered at the site in July last year. The bars match in weight, sterling quality, and tally number with three listed on the *Atocha*'s manifest. Duncan Mathewson, a professional archeologist who is working on the site as a part-time consultant to Fisher, says that, although he cannot prove so archeologically, the great probability is that the site is that of the *Atocha*.

The Florida division of archives and history is of no great help in resolving the dispute. According to Robert Williams, director of the division and a former state senator, "We don't say it is or isn't the *Atocha*." The artifacts found on the site are "elements of an early 17-century Spanish vessel," but the division has not yet had the time or resources to identify the site further, Williams says. The division's marine archeologist, W. A. (Sonny) Cockrell, is an expert on prehistoric man, not Spanish wreck sites, and in any case disqualifies himself as a source of objective opinion: "I am Fisher's enemy, I cannot tell you anything in support of his claim. . . ."

Fisher is well accustomed to such controversy. Abrasive at times, yet possessed of much personal charm, he arouses strong feelings in both friends and critics. The most successful of Florida's salvors, he has kept his operation afloat while others have gone bankrupt. Whether or not he has the *Atocha*, he has continued searching for the 1622 fleet long after others would have given up. The Spanish kept their first salvage party at work for 4 years on the 1622 fleet, and continued to send teams to the site up until the 1680's. Fisher has sought the ship for 7 years, sinking \$700,000 into the gamble that, even if he found the ship, the treasure would still be there.

The Spanish did in fact come very close to salvaging the *Atocha*. They found the galleon only 3 days after the storm, sunk in 54 feet of water with its mizzenmast sticking up above the water. Divers recovered two bronze cannons but could not open the ship's hatches. A month later, a second hurricane occurred, and the *Atocha* disap-

peared from view, presumably broken up and buried beneath the shifting sands of the area.

A salvage party sent out from Spain by the Marquis di Cadierata, captain-general of the fleet, built the first recorded diving bell to search for the *Atocha*. To work as divers they imported slaves from Cuba and then Indian pearl divers from the Isla de Margarita off Venezuela. They found and salvaged half the cargo of the *Santa Marguerita*, which went down within sight of the *Atocha*. But they failed to find the *Atocha* again or any of its 40.7 troy tons of gold and silver.

Fisher of course had modern equipment for his search—much of it developed by his own company, Treasure Salvors, Inc., but unlike the Marquis di Cadierata's men, he did not have the advantage of knowing just where the ship went down. The only information available when he began his search in 1966 was a well-known Spanish text stating that the *Atocha* and the *Marguerita* went down off the "head of the matecumbes."

Like everyone else, Fisher and his team started looking off the two keys near the Miami end of the chain, called the Lower and Upper Matecumbes. Two new inventions helped speed the search. Fay Field, an electronics expert with the company, developed a magnetometer with improved sensitivity capable of detecting objects such as a large cannon at a range of 50 feet. Fisher, with Field's assistance, invented an underwater excavating device known as a mailbox. Essentially a baffle that is lowered down over the propellers of an anchored vessel, the mailbox deflects the prop wash downward in a spiraling column of water that removes sand some 30 times faster than digging devices hand-held by divers. Another Treasure Salvors invention is a metal detector, being developed by Arnold McLean. The device is an adaptation of a mine detector McLean helped design during the Second World War for the Naval Ordnance Laboratories.

While the Treasure Salvors team searched the Matecumbes, Eugene Lyon, a Spanish-speaking historian whom Fisher met at a Bible class in Vero Beach, was searching the Spanish imperial archives. Working through the mouldering documents of the Archivo General de Indias in Seville, Lyon came to realize that in 17th-century Spanish the word *matecumbes* referred to the keys in general, not just the two islands of that name.



A Treasure Salvors boat uses a "mailbox" for excavating an English shipwreck off New Ground reef. Baffles over the boat's propellers deflect the wash downward into the seabed. The original purpose of the device was to increase visibility in muddy sites by sending clear surface water down to the bottom. It was then found that the mailbox was a powerful sand mover.

Fisher decided that "head of the matecumbes" meant the Miami end of the keys and relocated his search team. Meanwhile Lyon turned up the original reports sent back by Cadierata's and later salvage parties. For security reasons the report writers avoided mentioning the location of the site, but from occasional slips Lyon figured that the parties were working off the Marquesas Islands near Key West. Fisher had guessed the wrong end of the island chain.

Even with Lyon's directions, the *Atocha* presented no easy target to a magnetometer, since it contained very little iron. It took two more years, and 80,000 miles of magnetometer traverses, before Treasure Salvors had the first indication that they were not pursuing a chimera: they discovered a 15-foot, galleon-type anchor.

In July last year divers brought up the three silver bars listed in the *Atocha*'s manifest. Fisher's enemies imply the bars could have come from elsewhere. According to Mathewson, they were pried off the bedrock in the presence of a state agent. Treasure salvor Burt Webber of Annville, Pennsylvania, contends that monograms on two of the bars do not match those on the manifest, and that the third bar could

match the manifest description just by coincidence. But Mathewson considers the differences are only those to be expected from a copyist working at speed.

The manifest, drawn up in Havana before the *Atocha* sailed, runs to 58 pages and lists, among other things, 901 silver bars weighing 63 to 75 pounds each, 264,000 silver coins, 121 packages containing gold objects, including a 750-ounce gold bar, 600 smaller gold bars weighing up to 50 ounces each, 38 gold bars of less than 25 ounces each, and 80 pounds of emeralds. Lyon, at present in Spain, is said to have valued the contents in the manifest at \$138 million.*

In the 15 months since the discovery of the three silver bars, further treasure finds have been tantalizingly slow. Fisher's critics contend that tons of treasure should now have been recovered if the site were really that of the *Atocha*. According to Robert Marx, the *Atocha* was carrying iron cannons which should be easily detectable by a magnetometer, yet none has been found. The ship sank in 54 feet of water, whereas Treasure Salvors is working in 20 feet. The objects brought up so far are probably from a merchantman or from one of the two salvage vessels the Spanish are known to have lost over the site, Marx believes.

The salvage vessel hypothesis was seriously considered by Mathewson but abandoned, he says, when he discovered ballast stones a foot and a half in diameter and weighing up to 80 pounds. Recovery of artifacts has been slow because the wreckage is strewn over an area about a mile long, and only a 350-yard section in the shallower region has yet been worked. Large magnetic anomalies have been detected in the deeper parts of the site, which is about 50 feet deep, as would be expected. Mathewson believes the region being excavated at present is the site where the *Atocha*'s sterncastle broke up. He thinks the main ballast pile—along with the cannons, treasure, and other heavy objects—will be found in the deeper water. A ballast stone was brought up

* The estimate is based on the assumption that, as historical artifacts, the objects are worth from 5 to 25 times their value by weight alone. The value used was the old price of gold—\$35 an ounce; the present price is \$155 an ounce. A sample of the 6000 coins then recovered from the site has been examined by a numismatic expert at the request of the division of archives and history. The expert valued the 12 percent sample he saw at \$50,000. If all the coins could be sold for the same price (which they could not be, because the market would be flooded and the price would drop) they would be worth about half a million dollars.

on one of the two occasions this region has been probed, but lack of time—this is only the fourth diving season on the site—and of money—Treasure Salvors has recently been in financial straits—have confined the search to shallower waters.

Mathewson's judgments about the site are assailed by critics who suggest that neither he nor Lyon would long be retained by Fisher if they started to doubt his claim to have found the *Atocha*. No wholly independent identi-

fication of the site is available because the one body that could give it, the division of archives and history, prefers to sit glued to the fence. But according to John K. Mahon, professor of history at the University of Florida and chairman of the advisory council of the division of archives and history, both Mathewson and Lyon are professionals who "would not distort their evidence just because they work for Fisher." Mahon has not studied the controversy over the site but says he has confidence in what-

ever Mathewson and Lyon may say about it.

By the end of last year the site had yielded 168 items of treasure, including the 3 silver bars, 8 gold bars, 7000 coins, an Oriental gold chalice set with emeralds inside, a jadeite pendant, an 8-pound silver pitcher, and 33 gold chains. Treasure Salvors has also recovered muskets, cannonballs, an astrolabe, and 364 other objects, some too entrusted to identify.

All objects are handed over as soon

Energy: Cannibalism in the Bureaucracy

Persistent reports that John C. Sawhill, administrator of the Federal Energy Administration (FEA), was in official disfavor were confirmed on 29 October when Sawhill resigned, effective 1 January. He will be replaced by Andrew E. Gibson, president of an oil transport company and a former Assistant Secretary of Commerce. In a news conference, President Ford made it clear that Sawhill's resignation had been sought by Secretary of the Interior Rogers Morton, chairman of the new inter-agency Energy Resources Council (ERC).

Faced with a continuing muddle in federal energy policy, Congress has tried to bring coherence to this field by establishing two new agencies, the FEA and the Energy Research and Development Administration (ERDA). Now, however, the muddling may simply be giving way to bureaucratic cannibalism.

In one of its first actions, the ERC, created by the legislation that created ERDA, has begun stripping the FEA of its primary responsibility for energy conservation and transferring that responsibility to agencies such as the departments of Transportation and Commerce.

Although the Federal Energy Administration Act of 1974 authorizes the FEA to call on other agencies for help in carrying out its mission, this new agency's mandate to assume primary responsibility for energy conservation is clear and unequivocal. The act declares that the FEA administrator shall "develop and oversee the implementation of equitable voluntary and mandatory energy conservation programs. . . ."

The mandate of the Energy Resources Council, on the other hand, is quite vague, consisting chiefly of the charge to ensure interagency "communication and coordination" in energy matters. Had Sawhill, the FEA administrator, been named chairman of the ERC, the status and importance of the FEA and its mission would have been reinforced. But, instead, President Ford named Secretary Morton, one of his closest advisers and an old friend from his days in Congress.

Long ambitious to have Interior transformed into a new "Department of Energy and Natural Resources," Morton has had reason to want the FEA cut down to size. But how effective Morton himself would be as an energy czar is open to question. A former chairman of the Republican National Committee, Morton has sometimes behaved more as a politician than as a committed

administrator of government policies. Last spring, to go along with an abrupt change of policy by a beleaguered President Nixon playing impeachment politics, Morton abandoned the proposed national land use legislation that he had previously supported warmly—a switch which Russell E. Train, administrator of the Environmental Protection Agency, refused to make.

After the ERC held its first regular meeting on 24 October, Morton announced that Secretary of Transportation Claude Brinegar will be principally responsible for having the automobile industry meet the President's goal of a 40 percent improvement in the fuel economy of new cars by 1979. He explained that this assignment was in keeping with a new policy of having various agencies assume the lead role in particular energy matters. Later, it was learned that Secretary of Commerce Frederick B. Dent would have the primary responsibility for having such energy-intensive industries as steel and aluminum use substantially less energy per unit of output.

The FEA has been conducting programs addressed to both these conservation objectives, and no longer to have the principal responsibility for them is a come-down keenly felt and resented by FEA officials. And they contend that more is at stake than their own bureaucratic self-interest. As one put it, to give major conservation responsibilities to departments such as Transportation and Commerce, which in some instances tend to regard industry more as a client than a subject of regulation, is like assigning "rabbits to watch over the lettuce." The Department of Transportation is set to assert its new leadership role at a White House meeting with automobile manufacturers on 29 October—a meeting from which the press and representatives of the labor, environmental, and consumer movements are to be barred.

As a new agency, the FEA has made mistakes, but, on balance, many observers in Washington seem to feel that it has performed capably. But Sawhill, its administrator, apparently is too aggressive to suit Morton and certain other officials, such as Secretary of the Treasury William E. Simon, who preceded Sawhill as energy administrator. It is widely believed within FEA and elsewhere that much of Sawhill's troubles arose after the news media reported that he had boldly suggested that President Ford seek a gasoline tax as an energy conservation and anti-inflation measure.—LUTHER J. CARTER

as found to the state for cleaning and cataloging. The state then takes 25 percent for itself and hands the rest back to the salvor. But the division of archives and history is trying to work off a 4-year backlog, and none of the *Atocha's* treasure—if *Atocha* it be—has yet been distributed.

Division director Williams is aiming to hold a divvy-up next July. (The rule is for the finder to divide the treasure into four equal piles and the state to choose the one it wants.) But by then matters may have passed out of the state's hands. Fisher's *Atocha* site lies within the coastal waters claimed by Florida but outside the 3-mile limit claimed by most other states. The Supreme Court is expected to rule this fall on an oil company challenge to Florida's boundaries, and may cut the state back to 3 miles. Every scrap of treasure would then belong to Treasure Salvors. But Fisher's salvage rights would no longer be protected by the state of Florida.

The state's delay in distributing the *Atocha* site treasure has not helped Treasure Salvors' financial situation. The company's ability to raise money for its operations has been hampered by two recent developments—an intervention by the Securities and Exchange Commission (SEC), and allegations by certain coin collectors that Spanish coins sold or given as collateral by Fisher are forgeries. In the rumor-prone—and cash-short—world of treasure hunting, these events have been inflated by Fisher's rivals into suggestions of wide-scale fraud which, on closer examination, have no solid basis.

Fisher has financed his treasure hunt by selling stocks and "investment contracts." Purchasers gained the right to a certain percentage of the wreck's value and were given coins salvaged from other wrecks as collateral. The SEC brought a civil suit against Fisher, alleging that these transactions were tantamount to the sale of securities, which by law must be registered. This January, Fisher signed a consent decree undertaking not to sell unregistered stocks. According to Don Reit, the SEC attorney who prepared the case, there was no reason to question the authenticity of the coins being offered as collateral.

Reit says that Fisher sold between \$1 and \$1.5 million of alleged securities in the last 3 years. According to Fisher, his 75 percent share of the *Atocha* is to be divided equally between his "backers," who are financing the

Atocha expedition specifically, and the stockholders in the Armada Research Corporation, a wholly owned subsidiary of Treasure Salvors. This means that for stockholders to break even, at least \$2.66 to \$4 million worth of treasure must be recovered from the site.

A suit was filed last month, against both Fisher and the state of Florida, by a stockholder with a 5 percent share in the wreck. But the stockholder's attorney, Norman Brown of Tampa, says the suit is intended simply to confirm his client's rights and no fraud is being alleged.

Counterfeit Coins

As for the allegations of counterfeit coins, the principal sources of complaint are two coin collectors, one of whom, Virgil Hancock of Houston, Texas, says he has "seen no piece from Treasure Salvors that I would consider to be genuine." At least two incidents cited by others as indicative of suspicion—withdrawal of some of Fisher's coins from a coin auction and retraction by an expert of a certificate of authenticity for the coins—turn out to have been instigated by Hancock. Hancock refuses to say why he believes the coins in question—Spanish "pillar dollars" of 1732 and 1733—are forgeries, on the grounds that the forger could easily correct his mistake if it became known. Another expert, however, indicates that Hancock's case is based on an historical argument about which there may be differing opinions. According to Charles Hoskins, head of the certification service of the American Numismatic Association, Spanish-American coinage is a dangerous subject in which experts, of whom he regards Hancock as one, tend to have strongly conflicting views. Others point out that coins of 1732 and 1733 are rare and hard to evaluate since most of the issue went down in the treasure fleet of 1733, salvaged by Fisher.

Fisher will doubtless weather his present financial difficulties and the rumor mills of coin collectors and treasure hunters. A more serious threat to the future of his business is the complaint by some archeologists that commercial salvors should be banned from all wreck sites of historical importance. "They are losing about 70 to 80 percent of the potential information in a shipwreck," says Carl Clausen, former state marine archeologist in Florida. Clausen says he quit 3 years ago because he "didn't want to bear the responsibility for the wanton destruction

of the people's heritage." He now holds the equivalent post in Texas, where salvage operations are supervised by archeologists. Should Florida follow Texas' example and prohibit commercial salvaging? "The public would be better off," says archives advisory council chairman Mahon, "but it's in the American grain for people to scramble about and have a little fun. We have an ancient tradition of treasure salvaging in Florida going back to the wreckers."

Regulations drawn up by the division of archives and history are designed to ensure that the salvors preserve at least some archeological information. Opinions differ as to how far treasure salvors cooperated. "On occasions Fisher departed so far from his operating procedures that his contract should have been taken away," says Clausen. According to a recent article by Robert D. Shaw of the Miami *Herald*, the division's records indicate that Fisher has been accused of "mishandling and breaking artifacts, failing to map sites properly, operating unsafe equipment . . . using a [mailbox] at . . . speeds high enough to destroy artifacts and blowing holes in a haphazard pattern."

Division director Williams objects that these were isolated instances of abuse which the state has taken action to control. But state marine archeologist Cockrell says that abuses have continued, that the archeology being done at the site is "minimal to nonexistent," and that he has recommended that Fisher's contract not be renewed.

Cockrell's suggestion seems unlikely to be followed because both Williams and Mahon believe that Fisher is cooperating reasonably closely, especially since hiring an archeologist. According to Mathewson, more archeology is being done on the *Atocha* than has been attempted at any other Florida site, and Fisher and his captains are cooperating as closely as could be expected. "I agree that some information is being lost, and the best way to protect these sites might be to close the salvors down," says Mathewson. "But until that time why don't we try to get what information we can instead of burying our heads in the sand like the state has been doing for the last 10 years."

Fisher for his part strongly denies that any significant archeological material is or will be destroyed. He reckons that more than 90 percent of available information is being recovered at present. This record may be harder to achieve when the ship's timbers are

reached, but Treasure Salvors' operation "is committed towards gaining as much archeological information as possible in the time available," Fisher says.

While controversies of one sort and another rage above the surface, Fisher and his team are pursuing their 7-year underwater treasure hunt to what they

hope will be the richest find ever made. On a single day early last month, divers brought up three more gold bars and two gold chains, each 6 feet in length. Meanwhile a magnetometer team has begun to prospect a few miles west of the *Atocha* site for the *Marguerita*, only half salvaged by the Span-

ish. Because of his remarkable perseverance, Fisher may well be thought to deserve whatever he finds. Certainly it is his by legal right. But the people of Florida probably deserve from their legislators a surer protection for their archeological heritage.

—NICHOLAS WADE

TIAA-CREF: for Richer, for Poorer, Married to the Market

For the TIAA-CREF* participant counting on the college pension plan to provide a margin of comfort in retirement, a reasonable reaction to the recent enactment of a federal pension reform law is a feeling of being a little ahead of the game. Major provisions of the law designed to guarantee an individual's rights to pension benefits he has earned are already embodied in TIAA-CREF programs.

Other developments, however, are a lot less reassuring. Inflation in recent years has outrun the growth of TIAA-CREF investments, and in the last 2 years the dollar value of CREF annuity units, on which CREF retirement income is based, has declined by a quarter.

The hypothetically average TIAA-CREF policyholder is probably vague on details of the pension plan and on how the current travail of the investment market affects the plan. But the events of the past 2 or 3 years are dramatic enough to justify his taking a keener interest.

TIAA and CREF are separate programs based on different kinds of investments and intended to complement each other. TIAA concentrates on investments which bring a fixed return—bonds, mortgages, real estate. The high interest rates of recent years have had a relatively favorable effect on TIAA payouts. The CREF portfolio, on the other hand, consists almost entirely of common stocks. The rationale is that CREF will provide a retiree with an income tied to the performance of a diversified portfolio of securities and that the long-term trend of the market

will be favorable. It means accepting the downs as well as the ups of the market, and CREF is sharing its current unpleasant experience with other pension funds and mutual funds. (The average policyholder splits his contributions between the two programs on the theory that TIAA and CREF have compensating strengths and weaknesses under differing market conditions.)

TIAA and CREF, therefore, are doing what they were designed to do. This, of course, is not much consolation to retired people watching inflation erode the buying power of the dollar while their income from CREF actually shrinks.

The TIAA and CREF investment policies that by and large have worked well for two decades are, temporarily at least, limping in an economy beset by high rates of inflation and unemployment, a depressed stock market, and major uncertainties about energy and food prospects. The question for TIAA-CREF participants, put simply, is whether the strategy governing TIAA-CREF in the past will prove efficacious in the conditions now emerging.

TIAA, established in 1918, is a mutation from a free pension plan for college teachers created in 1905 through a \$10 million benefaction from Andrew Carnegie. With the expansion of higher education, it became clear that private philanthropy could not sustain the program, and a study made in conjunction with leaders in education produced the design of a private pension plan financed through contributions from faculty members and other employees of colleges and universities and from their institutions.

The TIAA participant holds a contract directly with TIAA which makes it possible for him to move from one institution to another and even to leave the profession without losing rights to benefits he has accumulated. The program is "fully-funded" in the sense that benefits to him are based on the flow of contributions over the participant's career and on the investment experience of the program. These features of "vesting," "portability," and avoidance of unfunded obligations anticipated the new federal pension reform law. The compromise measure enacted into law includes fairly modest vesting and funding provisions, but lacks effective portability requirements of the sort incorporated in TIAA and CREF.

When a TIAA participant retires, an annuity is purchased in his behalf which guarantees a fixed dollar income plus dividends that are decided on annually by the TIAA trustees. This year the return to a retiree on his TIAA accumulation was 7½ percent. (Total assets of TIAA were about \$3.4 billion at the end of 1973 compared to \$3.0 billion at the end of 1972.)

CREF is a newer program which was itself, somewhat ironically, a product of inflation. During the 1930's depression, TIAA retirees fared reasonably well because prices were low and stable. After World War II, however, rising prices put pressure on people living on fixed incomes. To come to terms with postwar conditions, the concept of a "variable annuity" was developed and became the basis of the CREF program, established in 1952. The study which provided the blueprint for CREF was directed by William C. Greenough, now chairman of TIAA-CREF, and a major influence in the organization over the years.

When a CREF participant retires, his "accumulation units" are converted to a fixed number of "annuity units" by a formula based principally on his record of contributions, age at time of retirement, sex, and retirement plan chosen. The dollar value of an annuity

* Teachers Insurance and Annuity Association and College Retirement Equities Fund.