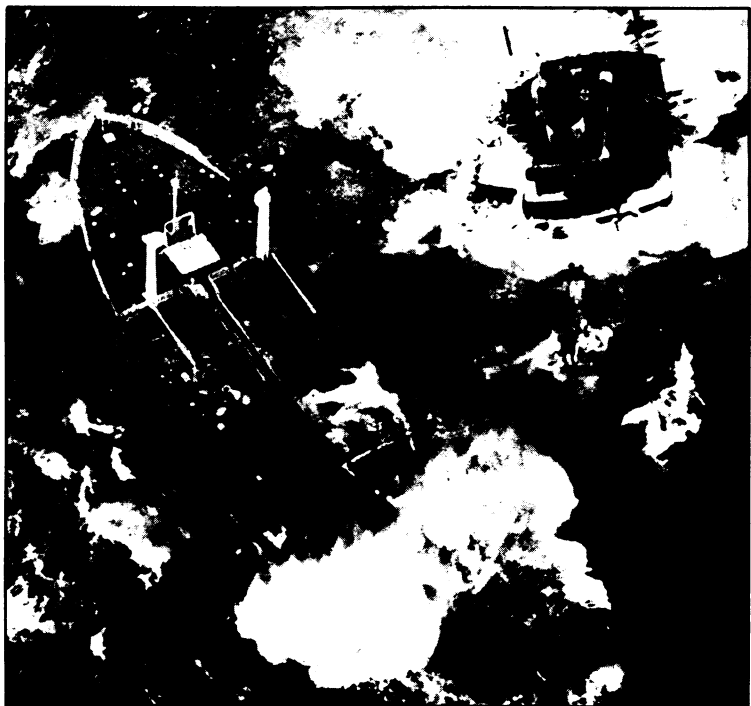


## Pouring troubled oil on Atlantic waters



*Argo Merchant split asunder: Oil spill may dislodge tanker-safety initiatives.*

Nothing stimulates prevention like an accident it could have forestalled. Thus the spilling of 7.5 million gallons of oil off Nantucket Island before Christmas promises to loose a flurry of tanker safety initiatives that have been stalled in Congress for months or years.

The sinking of the *Argo Merchant* underscored almost every weakness in the present system of shipping oil:

- The ship itself was 23 years old and has had 18 other accidents since 1964, including two previous groundings. Within a week after becoming stuck on a sandy shoal, the aging 640-foot vessel broke into three pieces, spilling its entire cargo.

- The ownership of the oil is being disputed among three separate companies, each claiming it belongs to another. Four national jurisdictions may be involved.

- Responsibility for the vessel has also been hard to assign. Like many tankers, the *Argo Merchant* is essentially an independent enterprise, operated by a one-ship company registered in Liberia. The owners are reportedly a group of Greek shippers based in New York. (Liberia nominally has the world's largest merchant fleet, although 40 percent of the vessels are actually American-owned. Liberian taxes and marine safety requirements are among the most lenient in the world.)

- Authority for investigating the accident is unclear. The ship was 10 miles off course when it went aground, and a depth sounder on board should have warned of danger in time to steer away. The Coast Guard has said it received information from a crew member indicating

the ship had intentionally been run aground and that the crew had been ordered not to cooperate with salvage parties. Yet, because the accident occurred 27 miles offshore, the Coast Guard may not be able to investigate the matter further.

- Existing methods were clearly inadequate to contain the spill. The thickness of the oil would have made it difficult to ignite, which might have caused more problems anyway. Skimmers and chemical dispersants could not be used because of heavy seas. The Coast Guard considered trying to tow the bow portion farther out to sea or to pump out the remaining oil, but it broke apart first.

- Knowledge of the effect of such spills remains rudimentary. The No. 6 industrial fuel oil—used to fuel electric power generators—was dispersed this week over an area covering at least 3,000 square miles, some of it over a part of the rich Georges Bank fishing grounds. The effect on flounder and haddock, as they approach their spawning season, is uncertain. So is the possibility of spread to other areas: Should the oil reach the turbulent region where the Gulf Stream meets the Continental Shelf, it could be scattered up and down the East Coast. Research vessels from the Woods Hole Oceanographic Institution, the National Marine Fishery Service and the University of Rhode Island were to sample marine life and make other studies.

Congressional action was immediate and furious. Sen. Edward M. Kennedy (D-Mass.) quickly organized an unusual evening hearing of his Subcommittee on Administrative Practice and Procedure to

question the handling of the affair. He also released a strongly worded statement indicating his belief that authority already exists to allow a full investigation and assessment of damages:

"I believe that Congress intended adoption of the 200-mile-limit bill to establish U.S. jurisdiction over incidents of this kind without further supportive legislation. . . . There are legal precedents in suits stemming from the Santa Barbara spill which indicate a right for private claims, even outside territorial waters, when the damage affects individual livelihoods."

These and other legal questions involved in the *Argo Merchant* incident will, of course, take years to sort out through the courts. (Says one knowledgeable observer, "The international lawyers are having a field day.") But several legislative initiatives are also underway. The Coast Guard will be pushed to set stricter standards for tankers entering American ports, possibly requiring double hulls. A liability fund among shippers may be established to ensure payment of damages even before responsibility is fully established. Legislation regulating offshore drilling may be modified to require buried pipelines, rather than tankers for carrying petroleum to shore. Treaties will be pushed to require better training of ship officers and crew, and better standards of ship construction. More research on the environmental effects of such spills will probably be funded.

Environmental Protection Agency Administrator Russell E. Train called the incident "the biggest oil spill disaster in our history." Usually it takes just such an event to shake loose all the preventive measures that have sat around waiting to be considered seriously. □

## Salem witchcraft: Ergotism rebutted

One of the more interesting if enigmatic tidbits in American history has been the 1692 outbreak of so-called witchcraft in Salem, Mass. Last year Linnda R. Caporael of the University of California at Santa Barbara hypothesized that ergotism, an illness resulting from the ingestion of ergot, a fungus with LSD-like properties, could have been responsible for the strange behavior of the eight young girls who made witchcraft accusations against their neighbors (SN: 4/3/76, p. 215). Caporael's explanation is plausible, but it has not convinced everyone. In the Dec. 24 *SCIENCE* Nicholas P. Spanos and Jack Gottlieb of Carleton University in Ottawa, Ontario, attempt to show that Caporael's arguments are not well founded.

First, say Spanos and Gottlieb, convulsive ergotism, the type of ergot poisoning

described by Caporael, has occurred almost exclusively in locales where the inhabitants suffered severe vitamin A deficiency. This is not likely to have been the case in Salem, a village that had ready access to seafood and dairy products rich in vitamin A. Also, say the researchers, the symptoms of the afflicted girls were not precisely those of convulsive ergotism. They suggest instead that "the afflicted girls were enacting the role of demoniacs as that role was commonly understood in their day." The illness of the girls had, in fact, gone undiagnosed for several months before a local physician finally suggested demonic possession. It was only then that the girls began "playing the role" of being possessed and making the witchcraft accusations.

Caporael does not deny the importance of social and psychological phenomena in the witchcraft episode. But, she told SCIENCE NEWS, social cues would not have been enough, especially at the beginning, and she was attempting to deal with the origins of the illness. She also says she is unaware of any solid evidence that vitamin A deficiency is necessarily linked to ergotism. As for the symptoms, she says that statements taken 400 years ago in an archaic form of English could be interpreted in several ways.

Caporael feels that the data presented do not sufficiently refute her hypothesis. But even though she remains convinced, she admits that she has not presented enough data to prove her point beyond a shadow of a doubt. Perhaps the 400-year-old puzzle will remain unsolved. □

## Glomar Challenger: Short of a record

For nearly 40 days and nights, the research ship Glomar Challenger floated in place off the Atlantic coast of North Africa, her hull and bulkheads continuously athrob with the churning of the engine that was twisting her long drill string into the sea floor. The hope was to drill the deepest hole ever made in the ocean bottom (SN: 9/4/76, p. 151), breaking the previous record of 1,740 meters set by the Challenger earlier this year off the northwest coast of Spain.

What broke instead was the hole itself, its soft walls repeatedly collapsing to jam the drill pipe until the hole was finally abandoned after 1,624 meters of penetration. The problems of such projects, however, are formidable. The top of the hole, for example, was at the bottom of 4,200 meters of ocean. The continental-margin sediments at the site offered a mushy mixture of mud and sand to drill bits designed to cut a more resistant medium.

Yet on this 50th leg of the global Deep Sea Drilling Project, thanks to drilling advances developed on previous legs, the

Challenger was able to sail away for a crew change, return four days later, and locate and reenter the very same hole. Furthermore, according to Leg 50 chief scientist Yves Lancelot of the French National Center for Ocean Exploration (ONEXO) and Edward Winterer of the Scripps Institution of Oceanography, "with better-designed drilling bits and better means to wall off crumbly parts of the hole, we can expect to reach much deeper."

Though short of a record, the hole was far from unproductive. It yielded sediment strata representing nearly 150 million years of history, including coarse material carried down during the rise of the High Atlas Mountains of adjacent Morocco. Changes in the strata will be analyzed to tell a tale of ponderous changes in the ocean floor as new infalls from the continent molded and folded the older sediments beneath.

Further study is charting the variations in the amount of organic material in the sediments—changing with time and pressure into the mature hydrocarbons that form oil and natural gas deposits. There is too little organic material at the site to qualify it as an economic petroleum reservoir, but the mature state of the material below about 1,200 meters suggests that where organic material is more abundant, the deep parts of the continental margin environment may be a favorable site for petroleum.

Following Leg 50, the Challenger traveled to Puerto Rico for refurbishment, then headed off on Leg 51 up the western Atlantic shelf. Five days later, however, the vessel was back in port, suffering problems with the bow thrusters that help her turn in her own length and hold position for drilling in the shifting seas. This week she was due to sail forth once again. □

## Launches: More science in '77

During 1976, only 2 of 18 satellites launched by the National Aeronautics and Space Administration were primarily for scientific purposes. The rest were weather-watchers, talksats and the like, primarily for other federal agencies, other countries and groups such as NATO and Comsat. This year there will be 7 scientific payloads out of 20 launches, with the rest devoted to communications (8), meteorology (3), earth resources (1) and navigation (1). And of the 7, NASA is all or partly responsible for 6.

The major launches of the year will be

the two Mariner Jupiter-Saturn spacecraft, planned to visit the two giant planets and possibly one or two more (see p. 10). The first of the long-awaited HEAO High-Energy Astronomy Observatories is scheduled for April liftoff. In October NASA will launch two spacecraft with a single rocket, one probe designed by NASA and the other by the European Space Agency as the first two-thirds of the cooperative International Sun-Earth Explorer series. The two probes—plus a third to be launched in 1978—will study different parts of the sun-earth system. Another NASA/ESA "coop" will be the International Ultraviolet Explorer, devoted to that field of astronomy. The seventh scientific probe is ESA's own, known as GEOS, sent to study the earth's magnetic field.

Communications satellites again dominate the schedule, though not nearly so heavily as last year, when 13 talksats were sent aloft for no fewer than 7 users. This year's entries, all of which are for outside users who will reimburse the space agency for launch costs, include only one "domestic" candidate: FleetSatCom, part of a global Defense Department system. There will be two for the multinational consortium known as Intelsat, one for the North Atlantic Treaty Organization and an experimental probe called OTS (Operational Test Satellite) for ESA. Talksats for foreign customers will include Indonesia's second Palapa, the experimental Siro for Italy and a Japanese communications satellite known on NASA's list simply as CS.

All three of this year's new weather-watchers will be placed in geosynchronous orbits, to look down on broad developing weather patterns from fixed positions over the earth: The second Geosynchronous Operational Environmental Satellite (GOES-B) for the Na-

*Continued on page 15*

### NASA 1977 LAUNCH SCHEDULE

Date	Satellite	User
Jan.	NATO-3B	NATO
Mar.	Palapa B	Indonesia
Apr.	HEAO-A	NASA
Apr.	GEOS	ESA
May	GOES B	NOAA
June	OTS	ESA
June	ITOS-E2*	NOAA
June	Transit 19	USN
June	Intelsat 4A-C	Intelsat
July	GMS	Japan
Aug.	Siro	Italy
Aug.	Meteosat	ESA
Aug.	MJS-A	NASA
Sept.	MJS-B	NASA
Sept.	Landsat C	NASA
Sept.	Satcom C*	RCA
Oct.	Intelsat 4A-D	Intelsat
Oct.	ISEE-A, B	NASA/ESA
Oct.	FleetSatCom	USN/USAF
Nov.	CS	Japan
Dec.	OTS*	ESA
Dec.	IUE-A	NASA/ESA
Dec.	Transit 20*	USN

\*backup launch possibility in case of prior launch or satellite failure