

# Trade in the Ancient World

*The seaborne commerce of Rome was unsurpassed until relatively recent times. Evidence for this marine traffic comes from many sources, including the newly stimulated underwater archaeology*

by Lionel Casson

**I** built five ships, loaded them with wine—worth its weight in gold at the time—and sent them to Rome. . . . Every one of my ships went down. . . . Neptune swallowed up 30 million sesterces in one day. . . . I built others, bigger, better and luckier, loaded them with wine again, plus bacon, beans, perfume, slaves. . . . When the gods are behind something it happens quickly: I netted 10 million sesterces on that one voyage.

The time is the first century and the speaker is Trimalechio, the famous character of Petronius' *Satyricon*. Petronius is, of course, exaggerating—but not much. In Roman times there was a fortune to be made in the export and shipping business. M. Porcius, a wealthy wine shipper who worked out of Pompeii, made enough money to contribute half the cost of building a public theater for his town, capable of seating 1,500 people. Sextius Fadius Musa, who shipped wine out of what is now Burgundy, set up a large trust fund whose annual proceeds were to go for a huge feast to be celebrated on his birthday forever. Archaeologists have found hundreds of wine jars stamped with his name in France and Italy, testifying to his far-flung activities. On Delos, a tiny island in the middle of the Aegean Sea, shippers so fattened on the lucrative perfume, spice and slave trade that they were able to establish orphanages and other charitable institutions, erect temples, put up statues and carry out all sorts of public improvements. Not only the shippers but also the bankers who financed them grew rich. Even Cato the Elder, that dour Roman farmer, was not averse to investing in the oriental trade.

**T**he Mediterranean in a very real sense made one world of the Roman Empire. The sea was the heart and around it the provinces stretched in a

wide arc. The arteries were the shipping lanes, the largest leading from points on the perimeter to the huge capital at Rome, and later at Constantinople. Over them passed the great ships, leaving on regular schedules to carry the thousands of bushels of wheat, the jars of oil and wine and salt fish. Both large and small vessels transported luxury goods ranging from Chinese silks to Athenian statuary.

To piece together the details of this ancient commerce the investigator must do without the wealth of detail available to the modern economic historian. He has no sets of national statistics, no annual records of boards of trade and the like. His bible is a voluminous geography written by an observant Greek named Strabo who lived around the turn of the first century. Strabo traveled widely in the Mediterranean, described the industry of each area and frequently added a brief sketch of its commercial history. A good deal of miscellaneous information comes from Pliny the Elder, a high official of the Roman Empire in the middle of the first century who spent his leisure time compiling a sort of encyclopedia which is a storehouse of all sorts of facts and a good many fancies. Once these two sources and minor ones like them have been exhausted, the researcher must seek the help of archaeology. Greek and Latin inscriptions that have survived on stone add nuggets of detail: a dedication to one of the Roman emperors found in the port of Rome records that it was erected by "the shippers of Africa"; a tombstone of a merchant unearthed in Asia Minor proclaims that the deceased rounded Cape Malea 72 times in his trading voyages to Rome; a decree of the Senate and Assembly of Athens announces the grateful thanks of the city to a shipper who had brought in a boatload of grain during a serious shortage. The best representations we

have of ancient vessels come from the graves of merchants who had a sketch of the craft to which they owed their fortunes inscribed on their tombs. Findings of Egyptian pottery in Crete, of Syrian glass in Italy, of Italian dishes in southern France and so on enable us to trace many lines of commerce. We can reconstruct the wine and oil trade from clay shipping jars, stamped with the place of origin, which excavators have unearthed at dozens of sites. A new and fruitful source of information is underwater archaeology. Divers, working under the direction of archaeologists, have carried out the delicate and in some cases dangerous task of investigating ancient wrecks and of identifying their cargoes. Although the first of the marine excavations was begun in 1907, virtually nothing more was done along these lines for the next 40 years. Since 1950 a dozen new wrecks have been located, and two have been seriously excavated. Present indications are that this will soon become an important phase of archaeology.

Obviously marine commerce began long before Roman times. On the tomb of Hatshepsut of Egypt is inscribed the story of a trading venture directed in 1500 B.C. by this first great queen known to history. Hatshepsut sent a fleet of merchantmen from Thebes on the upper Nile via the Red Sea to the Somali coast to bring back a huge cargo of incense. Though this story has long been known, another bit of evidence came to light 50 years ago. A group of Egyptian peasants looking for firewood stumbled upon a papyrus which turned out to contain a diary dating from about 1120 B.C. kept by an individual named Wenamon. Wenamon was a special envoy whom Pharaoh Ramses XI sent to buy lumber from Byblos in Syria, and the diary records the events of his trip. Moreover, his story indicates clearly that

it was not the first time that lumber had been shipped along this route; the traffic had been going on for centuries.

Not long before Wenamon's time the Trojan War had taken place. Some historians and archaeologists see in it a struggle between Greeks and Trojans for possession of the Dardanelles, which controlled the water route between the Aegean and the Black Sea. In Homer's poems describing the conflict we see, too, something that was always to plague the shippers of the Mediterranean: piracy. The Greek raid that ended in Achilles' famous retirement to his tent was nothing more than a piece of piratical brigandage.

By the fifth century B.C., when Athenian civilization reached its height under the rule of Pericles, a pattern of trade on the sea began to emerge. The average Greek town was virtually self-sufficient. Large cities such as Athens and Corinth, on the other hand, were getting too big to be fed by the produce of the surrounding countryside and had to start importing. Three staples formed the basis of trade: grain, wine and olive oil. Then as now the Crimea and Sicily produced a large grain crop and ships unloaded thousands of bushels each year at Piraeus, the port of Athens, taking in exchange Athenian olive oil or gaily painted pottery dishes and other kitch-

enware. Greek islands off the coast of Asia Minor, such as Rhodes and Chios, annually produced thousands of gallons of both cheap and choice wines that were sold all over the eastern Mediterranean; the distinctively shaped jars in which they were carried have turned up in practically every archaeological excavation in the area. Where today the cash crop of Egypt is cotton, in ancient times it was grain, and she joined Sicily and the Crimea in feeding Greece and the Greek islands.

An economic iron curtain closed off the western Mediterranean, which was under the sway of the great commercial empire of Carthage. All North African grain, Sicilian wine, Spanish silver and Italian iron carried there traveled in Carthaginian bottoms. The Carthaginian navy maintained a hawklike police system, and any trespassing ship was sunk.

The great changes that followed in the wake of Alexander the Great about 300 B.C. transformed this picture. In the eastern Mediterranean the focus shifted from Greece. There arose, stretching from the Balkans around the sea to Egypt, a series of powerful monarchies which maintained lavish courts and huge armies. The shippers now had more to do than merely supply a handful of large Greek centers. Here were armies needing supplies in bulk and a nobility which could afford luxu-

ries. An immensely varied and genuinely international trade was the result.

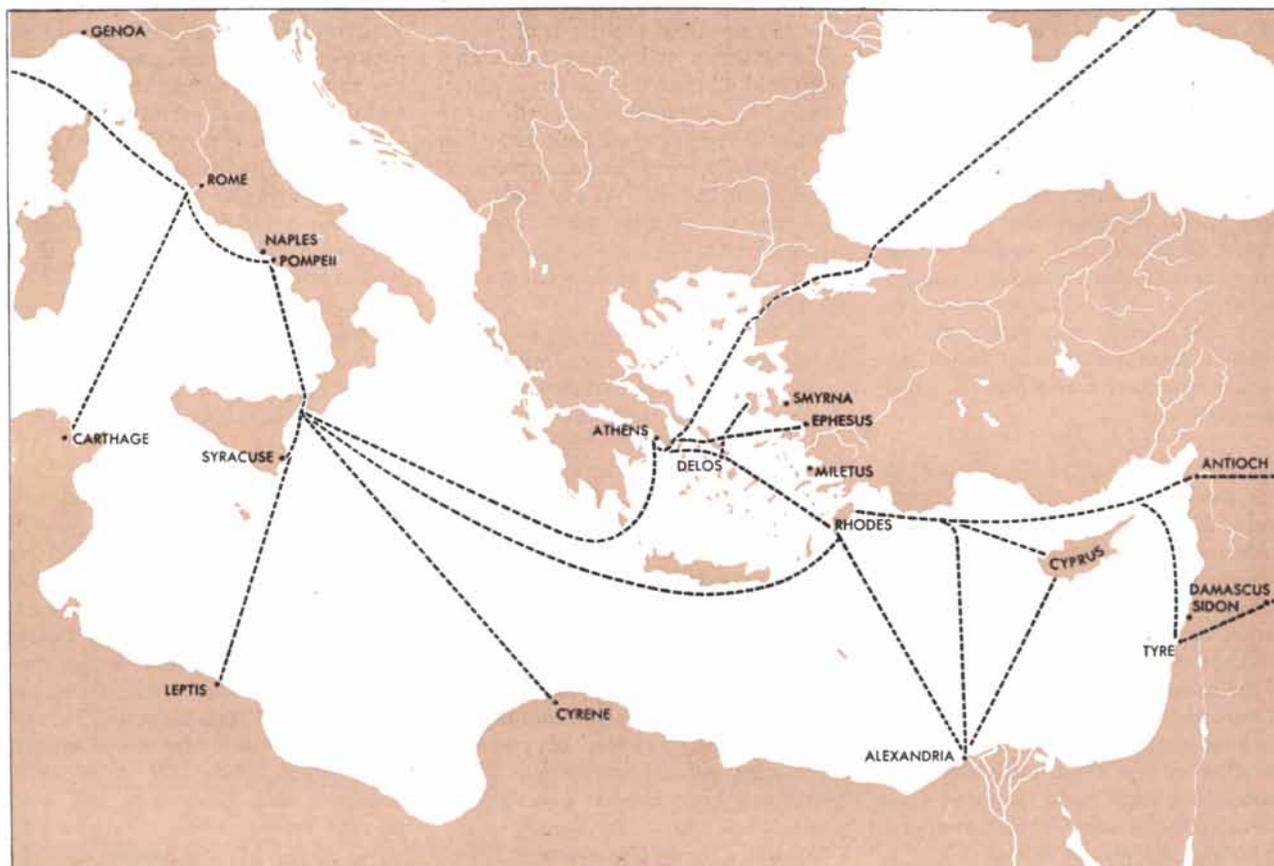
In the west Rome had broken the power of Carthage and started her massive movement toward the east. By the middle of the first century B.C., when Caesar was conquering Gaul, the whole of the sea came under Roman domination. It was then that the Mediterranean became one world, and the city of Rome emerged as its biggest customer. If the Roman populace wanted bread and circuses, they had to be supplied from abroad. Thus one of history's greatest merchant marines came into being, for everything from the grain to the gladiators and lions was brought to Rome by ship.

The international maritime trade now took on the form it was to have for the first 400 years of the Christian era. The great shipping lanes were marked out from all parts of the Mediterranean to Rome. The bulk of the trade was still grain, oil and wine. Ironically we have relatively little information about this thriving period. The historians Thucydides, Polybius and Livy noted military and political events but not economic statistics. But every now and then, through some accident, a revealing figure is preserved. We happen to know, for example, that each year Rome imported at least 15 million bushels of



ARRIVAL of a great cargo vessel in the port of Rome is recorded on a second-century A.D. relief. The owners offer sacrifice on the

stern as the lighthouse is passed. The protecting gods and goddesses, including Neptune and Bacchus, and the Emperor are represented.



**TRADE ROUTES** at the height of the Roman Empire are indicated on this map. There were other routes, but these were the most important. From France and Spain to Rome went wine, oil and minerals. From Carthage and Leptis went grain and oil; from Syracuse and Cyrene, grain. Alexandria sent grain, papyrus, incense and

other oriental products, and received wine from Rhodes. Athens was scoured for works of art. Smyrna, Ephesus and Miletus shipped wine to Delos and Athens. Rhodes sent wine to Athens and all the eastern Mediterranean. From India went spices and jewels and Chinese silks overland to Seleucia, thence via Antioch or Damascus.

grain from North Africa and Egypt. For more details, however, we must turn to the evidence brought to light by excavations. Thus it is known that, before Caesar overran Gaul, the Gauls imported wine from southern Italy. Recently, with the help of divers, French archaeologists examined the wreck of a Roman ship outside the harbor of Marseilles; they found that it was loaded with several thousand jars of wine, which probably came, sometime around 200 B.C., from vineyards that once flourished on the slopes of Mount Vesuvius. More Italian archaeologists enlisted the aid of one of Italy's best-known salvage experts to investigate a wreck that came to light a number of years ago near Genoa. This ship was carrying more than 3,000 jars of wine—over 20,000 gallons—and was very likely making its way from southern Italy to Gaul when it went down. But by 100 A.D. or so the pendulum had swung the other way, and Roman shops were selling French, Spanish and Greek vintages. We can tell that thousands of gallons of wine and oil now came to Rome from North Africa, France and Spain,

for today there is a good-sized hill on the outskirts of the city called Monte Testaccio—"Mount Potsherd"—which excavation has shown is composed entirely of broken oil and wine jars from these countries. This mound stands beside the site of wharves where for 400 years stevedores unloaded these commodities.

Shipping bulky and cheap cargoes like grain, oil and wine was, as we have seen, an essential trade; many, like Trimalchio, made fortunes at it. But the really big profits lay in a more risky form of commerce. By 250 B.C. a market for luxury goods had come into being. Wealthy men in great Mediterranean centers like Rome, Alexandria, Antioch or Marseilles wanted exotic woods, ivory, oriental rugs and tapestries for their homes, and perfumes, silks and rare table delicacies for themselves and their wives. To meet the demand fixed trade connections were opened with the Far East. Indian merchants entered the picture as middlemen for Chinese silks and Far Eastern spices and as prime suppliers for India's own products: ebony, beryl, pearls, cinnamon and, above all, pepper.

The trade was brisk: it is common to find Roman coins in excavations in southern India. Even a manual was available for the use of merchants who operated in these areas. Like the Coast Pilots issued by our Hydrographic Office, it gave detailed information on harbors, markets, wind and weather conditions and so on. The manual has fortunately been preserved and, as a consequence, this phase of ancient commercial activity is one of the best documented of all.

Each year camel caravans made their way overland from India to Seleucia (now Baghdad), then west to Antioch or, through Damascus, to Tyre where the goods were loaded aboard ship. Alternate and somewhat safer routes lay by sea. Ships worked from the west coast of India up to the head of the Persian Gulf, where their cargoes were transferred to camels that joined the caravans at Baghdad. Another route, favored because it was practically all by water, was in the hands of Alexandrian merchants. Each year a fleet of ships left from the Red Sea for the west coast of India and brought their cargoes back

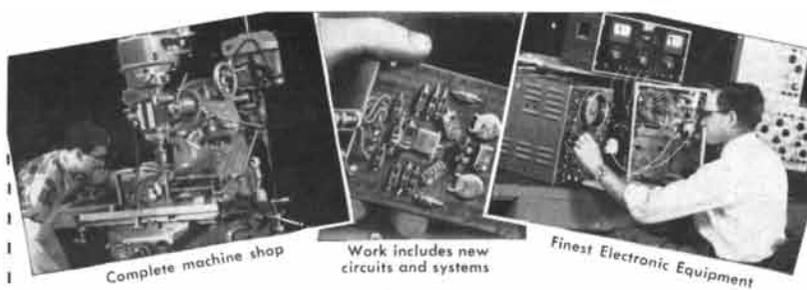
to a tiny Red Sea transshipment point called Myos Hormos (Mussel Harbor). Here the goods were transferred to camels and carried the relatively short distance overland to Coptos on the Nile, from which point they were barged down river to Alexandria for transshipment. Profits were tremendous, but so were the risks. There were mountains, deserts and bandits along the caravan routes, and squalls, shoals and pirates in the Red Sea. The trip—eight months at the least—was depressingly long.

The shipper who was willing to give up a portion of his profit in exchange for a somewhat safer and quicker return went into the perfume and incense trade. Frankincense was burned daily on hundreds of thousands of altars all around the Mediterranean. Most of it came from the southern coast of Arabia, namely Yemen and the Hadhramaut. Hundreds of vessels loaded up Arabian incense, added perfumes and ivory and other products from nearby Somaliland and carried their cargo to Myos Hormos, from which point they followed the same route as the shipments from India.

A particularly profitable form of ancient commerce was the slave trade. It rose to its height between 300 and 50 B.C., when the ancient world was rent by practically continuous war; it died only when the Roman Empire finally imposed peace. The Greeks and the Romans had long made a practice of selling their prisoners of war into slavery. When this source began to run short, pirates stepped in to bolster the supply.

Piracy had plagued the Mediterranean for centuries. The Egyptian scribe Wenamon tells of being chased by pirates off the coast of Syria. Piracy had surely existed from long before the time of Wenamon, and the Mediterranean was not safe until 1815, when the U. S. Navy finally quelled the brigands of North Africa. For several centuries the pirates were held down fairly well by the excellent navies first of Athens and then of Rhodes. But when Rhodes lost its power about 150 B.C. the pirates broke all bounds. Establishing headquarters on the southern coast of Asia Minor, they set themselves up in what amounted to organized business. Not content with abducting men off ships they would descend on coastal towns and carry off whole populations. Most of the victims were brought to the island of Delos for sale. Strabo estimated that the slave market there could handle over 10,000 slaves a day.

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the coast of Italy and kidnaped for ransom wealthy ladies and Roman officials traveling along the highways. The authorities decided that this was enough. A special command was proposed, Cicero delivered a speech urging its adoption, and Pompey the Great was put in charge. Within a year (67 B.C.) the seas were free of pirates.

The scope of sea-borne commerce in the ancient world was so vast that it is hard to realize the handicaps under which the Greek and Roman sailors worked. They had no compass, but in the clear air of the Mediterranean, where by day islands may be seen from miles away and at night the stars are rarely obscured, this was not as serious a lack as it might appear. They used clumsy steering oars instead of the stern rudder that was to be invented in the Middle Ages. The bulk of their cargo had to be moved in the summer months, when the Mediterranean was calmer than in winter. They even had to build most of their own harbors. Although the Mediterranean has many coves suitable for small vessels (and also for pirates), it has few large-scale natural ports. Alexandria, Piraeus, Syracuse and Marseilles were excellent natural ports, but the list stops about there. Rome's harbor near Ostia, which from A.D. 50 handled more goods than any other in the empire, was completely artificial. So was the harbor built for Antioch, in Syria, a great transshipment point. Archaeologists have found protective jetties at almost every known ancient seaport. Around the site of the great port of Tyre divers have succeeded in tracing massive underwater

moles which once embraced the city's harbor.

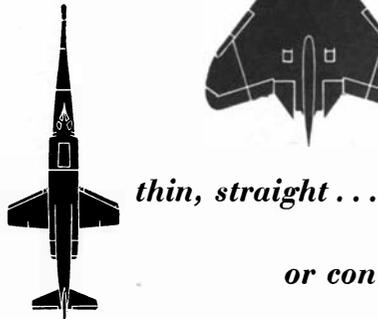
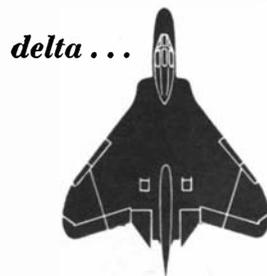
The ships were slow and clumsy, but they were safe. The emperors of Rome, with the vast facilities of the Roman navy at their disposal, often preferred to travel by private merchant sailing ship. "When you go to Palestine," Emperor Caligula once said in effect to the young prince Herod Agrippa, "don't travel by galleys and the coastal routes, but take one of our direct Italy-Alexandria merchant ships." The average merchantman ran about the size of a large harbor tugboat of the present day and carried between 150 and 250 tons of cargo. But on the major runs, such as the grain trade between Egypt and Rome, ships almost 200 feet long and capable of transporting 1,200 tons were employed. These ships were about the size of a 19th-century U. S. frigate—only slightly smaller than a large modern ferryboat. They could take tremendous loads. Thus in 1585, when Pope Sixtus V's architect Domenico Fontana moved an Egyptian obelisk from one point in Rome to another, he was hailed as a brilliant engineer. Actually he was much less impressive than the engineers of Caligula. In 40 B.C. they took the obelisk and its base from its original site in Heliopolis near Cairo, loaded its 500 tons aboard the biggest ship available, added 800 tons of ballast to steady her, sailed it successfully across the sea, transferred it to a river barge to bring it up the Tiber and erected it at the point where Fontana found it. This was only one of several obelisks that were successfully transported across the Mediterranean to Rome.

The cargoes of a Roman ship were



WINE JARS were removed from the hulk of a Roman ship which sank off the harbor of Marseilles about 200 B.C. They are of Italian origin, and each holds over seven gallons.

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TEMPLE COLUMNS, prefabricated in sections, were raised off St. Tropez by archaeologists. They were on a ship probably bound from Rome to Gaul in the second century A.D.

stored not only in the hold but also on deck. Grain was carried in sacks, but most other commodities—oil, wine, salt fish—were packed in heavy pottery jars. A typical jar had a capacity of seven to eight gallons and weighed, when empty, upwards of 50 pounds. Passengers lived and slept on deck—as many still do today in the mild Mediterranean climate. The largest ships carried more than 600 passengers on a long journey. The vessel in which St. Paul was wrecked in A.D. 62 had only 270 aboard, but he was traveling late in the year toward the end of the sailing season.

At Rome and other cities where harbor facilities were poor, large ships unloaded onto small harbor craft, which carried the cargo either to docks or upriver to the city itself. The organization of a busy harbor was just as complicated then as it is today. Ships were given permission to enter, were assigned berths, had their cargoes checked against the manifests, took on a return load under equally careful supervision and left only after receiving clearance from the harbor master. By a quirk of fate, an actual cargo manifest over 2,200 years old has been preserved. Apollonius, an official of Ptolemy II around 250 B.C., had as secretary a certain Zenon, who apparently was the kind of man who never threw away a piece of papyrus. By great good luck his voluminous files were discovered, preserved for two millennia in the dry soil of Egypt. One of the documents is the cargo list of a small coastal vessel which had loaded up at a Syrian port to discharge at Alexandria. The vessel arrived carrying the following goods. Table wine: 63 jars (probably holding seven gallons

each); two half-jars. Dessert wine: 10 jars. Olive oil: two jars; one half-jar. Vinegar: two jars. Honey: seven half-jars. Dried figs: 10 jars. Nuts: one jar; three baskets ( $2\frac{1}{2}$  bushels). Seeds: one basket. Cheese: one jar. Wild boar meat: 10 jars. Venison: two jars. Goat meat: two jars. Rough sponges: one basket. Soft sponges: one basket.

The economic story this list tells is clear. Here was a shipment of imported table delicacies. From the wharves of Alexandria they would make their way to the markets, and from there to the kitchens of the court or of the local ship-pers and industrialists. Foreign food-stuffs were not the only luxuries that the wealthy of Alexandria and elsewhere brought in to enhance their mode of living. They imported works of art on a large scale as well. Forty-odd years ago a shipwrecked vessel was discovered off the coast of Tunisia loaded with marble statuary and prefabricated temple columns from Athens. Some of the finest Greek bronzes we have today were fished up from a wreck discovered by sponge divers off the east coast of Greece.

The intensity of all this traffic and the number of ships involved in it were unsurpassed until comparatively recent times. The sea-borne commerce of Roman times never died out entirely. The massive trade in staples came to an end when there was no longer an empire which needed them, but there was still a demand for silks and spices and perfumes. Commerce in these precious commodities lived on to furnish the vast wealth of the Genoese and Venetian republics of later days.

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Our engineers at Nela Park have developed a rapid method of testing such lamps for the quantity of chemical on their cathodes without breaking open or lighting the tubes. The lamp is compared in an electronic circuit with one having an uncoated cathode. When current is applied, the coated cathode is slower to increase in temperature. The difference is roughly proportional to the weight of the emission coating, and it can be read on a meter.

## RADIOACTIVE SILICONES

Our Silicone Products Department in Waterford, New York, recently made joint announcement with Abbott Laboratories of North Chicago, Illinois, of an Abbott Laboratories project making radioactive silicones available for medicine and industry. Such silicones may prove to be a valuable research tool in certain areas. Radioactive silicone fluids, for

example, are made readily measurable in minute amounts by the incorporation of Carbon-14, and they are expected to offer a clearer insight into the behavior of silicones in the human body than could previously be obtained.

The new fluids have been designed for laboratory and clinical test work. They will not be a part of finished medicinals sold to the consumer. In conformity with Atomic Energy Commission practice, such initial studies must be conducted on animals only.

## FILM FIXER

What camera fan hasn't spent hours in a darkroom trying to minimize the harmful effects of scratches, dust, or fingerprints on his favorite 35-mm negative? Thanks to Dr. C. Guy Suits, vice president and director of our Research Laboratory, all three of these defects can now be corrected.

Dr. Suits, one of whose hobbies is photography, found that most of the troublesome damage from scratches occurred in the film base or in the gelatine overcoat, rather than in the silver image between. He reasoned that a liquid with the right properties might fill the "valleys" formed by scratches and eliminate the valley side surfaces that scatter light. Although glycerine has been used for this purpose, it is very viscous and forms bubbles.

He finally found the solution in a silicone oil, which has been named Refractasil. Not only did it solve the scratch problem, it also turned out to be a highly satisfactory cleaner, removing fingerprints like magic. And with a special circulating container designed by Dr. Suits, it served to remove dust particles, as well.

Equipment using the Suits technique may soon be marketed by another manufacturer. Refractasil, the silicone oil, is already in production in our Silicone Products Department at Waterford, New York.

*Progress Is Our Most Important Product*

**GENERAL  ELECTRIC**