simultaneously with single stars as by-products of essentially the same formative process. It is also evident that the chemical composition of the two components in each pair was initially the same at the time of formation. Their masses, however, were different and this has made all the difference in their subsequent evolution. The story of this evolution containing new ideas is told in the last chapter of the book.

This volume amply fulfils the main purpose of the International Astrophysical Series, which is to provide an authoritative account of the subjects in a manner to assist their teaching and advancement.

UNITED STATES' SUCCESS IN MANNED SPACE FLIGHT

A NOTABLE success in space flight was achieved by United States when on May 5, 1961, it sent a man into space and recovered him safely. The astronaut was 37-year old Commander Alan Shepard of the United States Navy. The space capsule in which Shepard rode was 6 ft. × 9 ft., a little bigger than a telephone booth, and weighed about one ton. It was blasted into the sky in the 66 ft. Redstone rocket from the missile base at Cape Canaveral, Florida, at 9·34 a.m. (14·34 GMT) on Friday, May 5, 1961. The capsule soared in a vast ballistic arc over the Atlantic and plummetted into the sea inside a ring of recovery ships just fifteen minutes later. Shepard climbed out of the capsule unaided and was winched to safety by a marine helicopter which landed both astronaut and capsule on the deck of the recovery ship, the aircraft carrier Lake Champlain stationed 290 miles downrange from the site of launching. The historic flight was the climax of two and a half years' work and 400 million dollars expenditure. It closely followed Russia's success in the first manned space flight just 23 days previously when on April 12, Major Gagarin orbited the earth once round in his 108-minutes flight in the space ship Vostok (*see Curr. Sci.*, April 1961).

The essential details of the US space flight have been reported as follows : The weather this morning was fine and Shepard was driven out to the launching pad in a van. His aluminised space suit gleamed in the glare of the arc lights as he squeezed through the tiny hatch of the capsule and wriggled on to the specially contoured couch. Shepard was sealed in the capsule at 6-10 a.m. (11·10 GMT). At blast-off, flame leaped from the base of the rocket and it began to lift into the air with a shattering roar, ponderously at first, then with gathering speed. Shepard was forced deep into his form-fitting couch by the fierce gravitational pull as the rocket vanished into the clouds and accelerated to a speed of over 4,000 miles per hour in a few seconds. Shepard's voice crackled into the tense control room. His first words were—"what a beautiful view". From then on, he reported continuously to the control room on how he felt and the behaviour of the rocket. He spent much of the flight with his eyes shut, reading the instruments by touch, as he fought the massive strain of 11 G.—eleven times the force of gravity. Subsequently Shepard reported : "I am now experiencing six G's-, five G's-, four G's-.

The capsule separated from the rocket when it was 90 miles up, and Shepard took over manual control of the capsule and performed basic manœuvres in different directions. He performed a roll successfully. He reported he had fired the retro-rockets to slow down the capsule before it plunged into the Atlantic. After being weightless for several minutes, Shepard prepared for the critical re-entry into the earth's atmosphere. He talked to recovery ships. Moments later slowed by the retro-rockets, the capsule decelerated further as Shepard opened his secondary parachute. Then the great red and white main parachute opened and watchers on the recovery ships saw the capsule for the first time as it drifted down to the Atlantic. A landing bag beneath the capsule inflated to cushion the fall when the capsule hit the sea 80 miles north-west of Grand Bahama island and three miles from the aircraft carrier Lake Champlain. Shepard climbed out of the capsule as a marine helicopter swooped down on him. Three minutes later he was aboard the helicopter, which also winched up the capsule.

An official announcement by the National Aeronautics and Space Administration (NASA) said : "The Project Mercury spacecraft carrying astronaut Alan Shepard on the nation's first manned flight landed on the Atlantic Ocean about 302 statute miles from here at 9-49 a.m. E.S.T. The altitude was about 115 miles, the speed about 5,100 miles per hour. The sub-orbital flight required 15 minutes. Preliminary data show the pilot performed satisfactorily during flight." The blast-off time was officially announced as 9 hours 34 minutes and 13 seconds a.m.