TABLE 2.—TEST OF HOMOGENEOUS HYPOTHESIS FOR INTERNAL CONSISTENCY ON 150°C, WET, DATA

Orientation	σ_{obs}	F_a	F_b	$F_a + 1.50F_b$	σ_{calc}	$\frac{\sigma_{calc}}{\sigma_{obs}}$
Q—Comp	1300	.72	2.00	3.70	1230	.95
R—Comp	1120	2.96	.27	3.36	1120	1.00
R—Tension	1480	.64	2.68	4.63	1540	1.04

Standard deviation σ_{calc} from σ_{obs} = 4.4%
τ_a = 330 kg/cm²
τ_b = 500 kg/cm²
$\tau_a/\tau_b = \alpha = 1.50$

the specimens concerned is unknown. Nevertheless, this constitutes some additional confirmation that the mechanism of deformation is not changed by the presence of water.

The effect of rate of loading was tested crudely in one experiment, illustrated in Figure 4. The stress was raised to 1530 kg/cm² at the normal rate of strain and then maintained nearly constant for 20 minutes (A to B). During this time the rate of strain decreased exponentially with time, indicating elastic flow. The stress was then raised (B to C) at

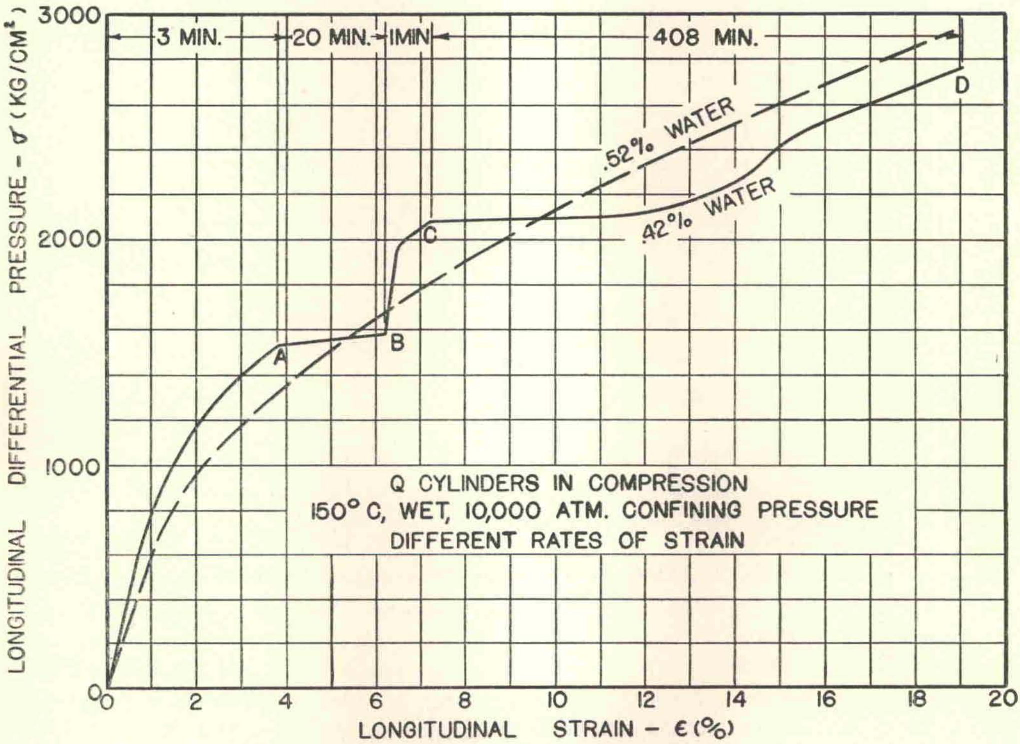

FIGURE 4.—EFFECT OF DIFFERENT RATES OF STRAIN

quently the effect of the water is now thought to be mainly mechanical. The difference between jacketed and unjacketed specimens in kerosene (Griggs, 1936, p. 567) is similar.

A test of the homogeneous deformation hypothesis on the three stress-strain curves of Figure 1, C yields the result shown in Table 2.

Too much weight should not be attached to this correlation, since there are only three observations, and the water content of one of

the normal rate of strain to 2080 kg/cm². It was then intended to keep the stress constant, but, because of apparatus difficulties, the stress gradually increased over a period of nearly 7 hours to 2760 kg/cm² (point D). The strain-time curve is not decipherable because of this complicated stress history, but there is no indication of anything but elastic flow. This experiment was intended to explore the possibilities of obtaining recrystallization at

150°C in the presence of water. All the evidence from the stress-strain-time history is negative. The fabric evidence will be discussed later. For comparison, the stress-strain curve of a similar specimen with slightly more water tested at the normal rate of strain (duration 14 minutes) is superimposed on Figure 4 (dashed line). The 7-hour test is seen to be only slightly different, consistent with the interpretation that only elastic flow occurred.

The effect of 5000 atmospheres vs. 10,000 atmospheres confining pressure is shown in Table 3, for dry specimens in several orientations, at room temperature and at 150°C. As reported before (Griggs, 1936; Balsley, 1941), the principal effect of 10,000 vs. 5000 atmosphere confining pressure is to increase the ductility. For example, an *R* cylinder may be stretched more than 20 per cent at 10,000 atmospheres with no signs of rupture, while at 5200 atmospheres rupture occurred at 13.6 per cent extension. A *Q* cylinder at 5200 atmospheres, however, showed no sign of rupture at 20 per cent extension. The difference between the two orientations is probably due to the fact that *Q* is oriented favorably for twinning while *R* is not. At 10,000 atmospheres, a *Q* cylinder has been stretched 45 per cent. Since the mean stress is probably a more significant parameter than the pressure of the confining fluid, values for mean stress are given in Table 3. The mean stress varied from 3770 to 12,260 kg/cm².

TABLE 3.—EFFECT OF CONFINING PRESSURE ON STRESS-STRAIN CHARACTERISTICS

Orientation	Temperature	Confining pressure σ_2 (Atm.)	At 3% Strain: Longitudinal stress $\sigma_1 - \sigma_2$ (kg/cm²)	At 3% Strain: Mean stress $\frac{\sigma_1 + \sigma_2 + \sigma_3}{3}$ (kg/cm²)	At 6% Strain: Longitudinal stress $\sigma_1 - \sigma_2$ (kg/cm²)	At 6% Strain: Mean stress $\frac{\sigma_1 + \sigma_2 + \sigma_3}{3}$ (kg/cm²)	At 12% Strain: Longitudinal stress $\sigma_1 - \sigma_2$ (kg/cm²)	At 12% Strain: Mean stress $\frac{\sigma_1 + \sigma_2 + \sigma_3}{3}$ (kg/cm²)	At 18% Strain: Longitudinal stress $\sigma_1 - \sigma_2$ (kg/cm²)	At 18% Strain: Mean stress $\frac{\sigma_1 + \sigma_2 + \sigma_3}{3}$ (kg/cm²)
Q—Comp	Room	4,900	3550	6250	4150	6450	4900	6700	5380	6860
Q—Comp	Room	10,000	3520	11500	4140	11710	5020	12000	5800	12260
Q—Ext	Room	5,200	1950	4720	2480	4550	3130	4330	3630	4160
Q—Ext	Room	10,000	2280	9570	2860	9380	3580	9140	4170	8940
R—Comp	Room	5,000	2610	6040	3220	6240	3950	6480	4510	6670
R—Comp	Room	10,000	2820	11300	3390	11500	4320	11770	5150	12050
R—Ext	Room	5,200	3950	4060	4340	3930	4600*	3840	Broke	—
R—Ext	Room	10,000	4200	8930	4750	8750	5510	8500	6140	8290
R—Comp	150°C	5,200	2050	6060	2600	6240	3290	6470	—	—
R—Comp	150°C	10,000	1850	10950	2370	11120	3140	11380	3690	11560
R—Ext	150°C	5,000	2350	4380	2950	4180	3720	3930	4180†	3770
R—Ext	150°C	10,000	2240	9590	2750	9420	3250	9250	3700	9100
Av. ratio 5,000/10,000:			.973		.974		.950		.940	

* Incipient rupture.

† Extrapolated from 16% strain.

In general, the longitudinal stress at a given strain is slightly less at 5000 than at 10,000 atmospheres confining pressure, and this difference increases for higher strains. The average values of the ratio of stress at 5000 to that at 10,000 atmospheres are given below the appropriate columns in Table 3. A notable exception is that all measurements at 150°C give higher stresses at 5000 than at 10,000 atmospheres. No explanation is offered for this.

Miscellaneous Effects

A specimen of Westerley granite was tested in compression at 150°C, wet, at 10,000 atmospheres confining pressure. A longitudinal stress of 6300 kg/cm² was applied. The stress-strain curve indicated some plastic flow. On disassembly, however, it was found that the