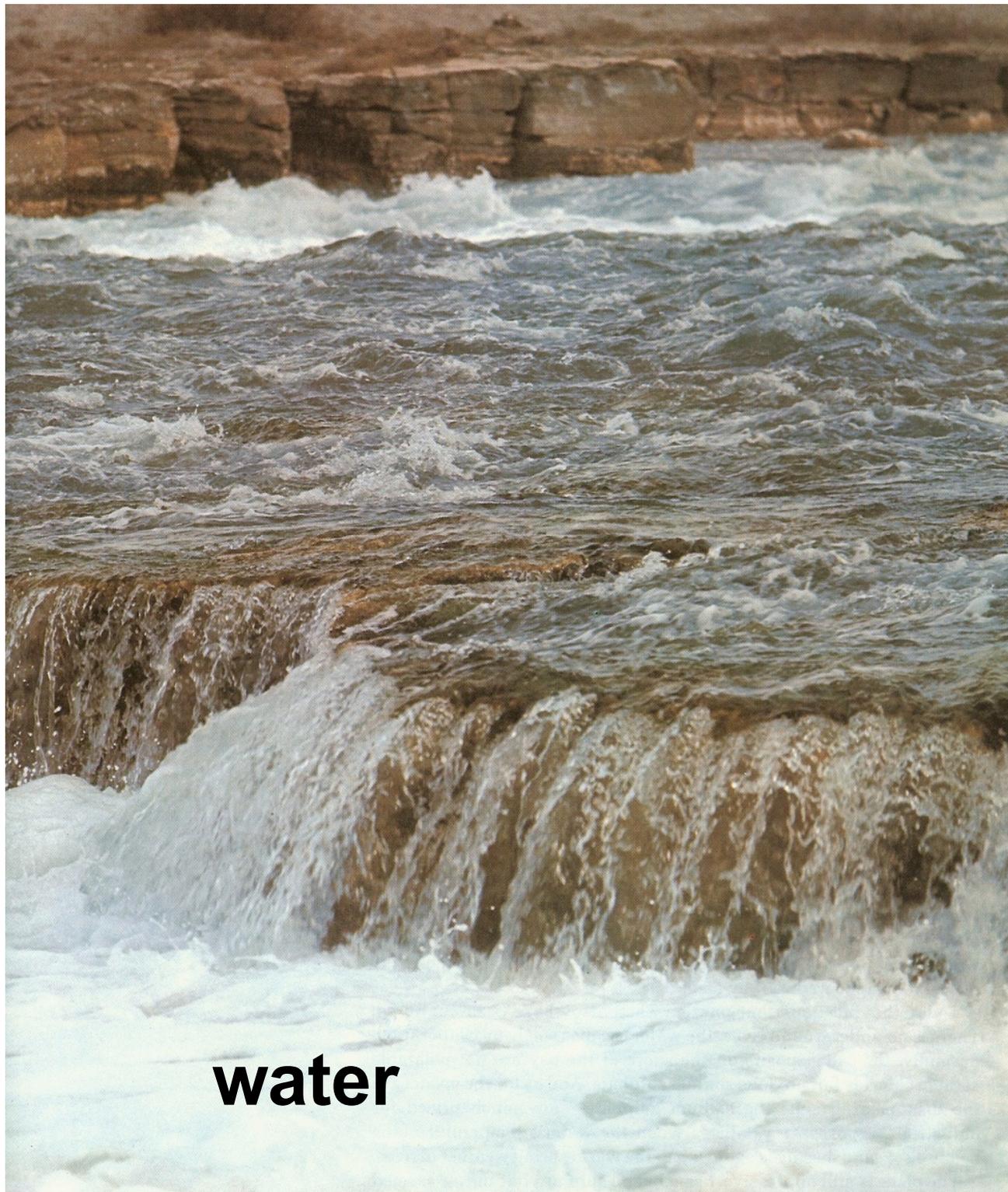


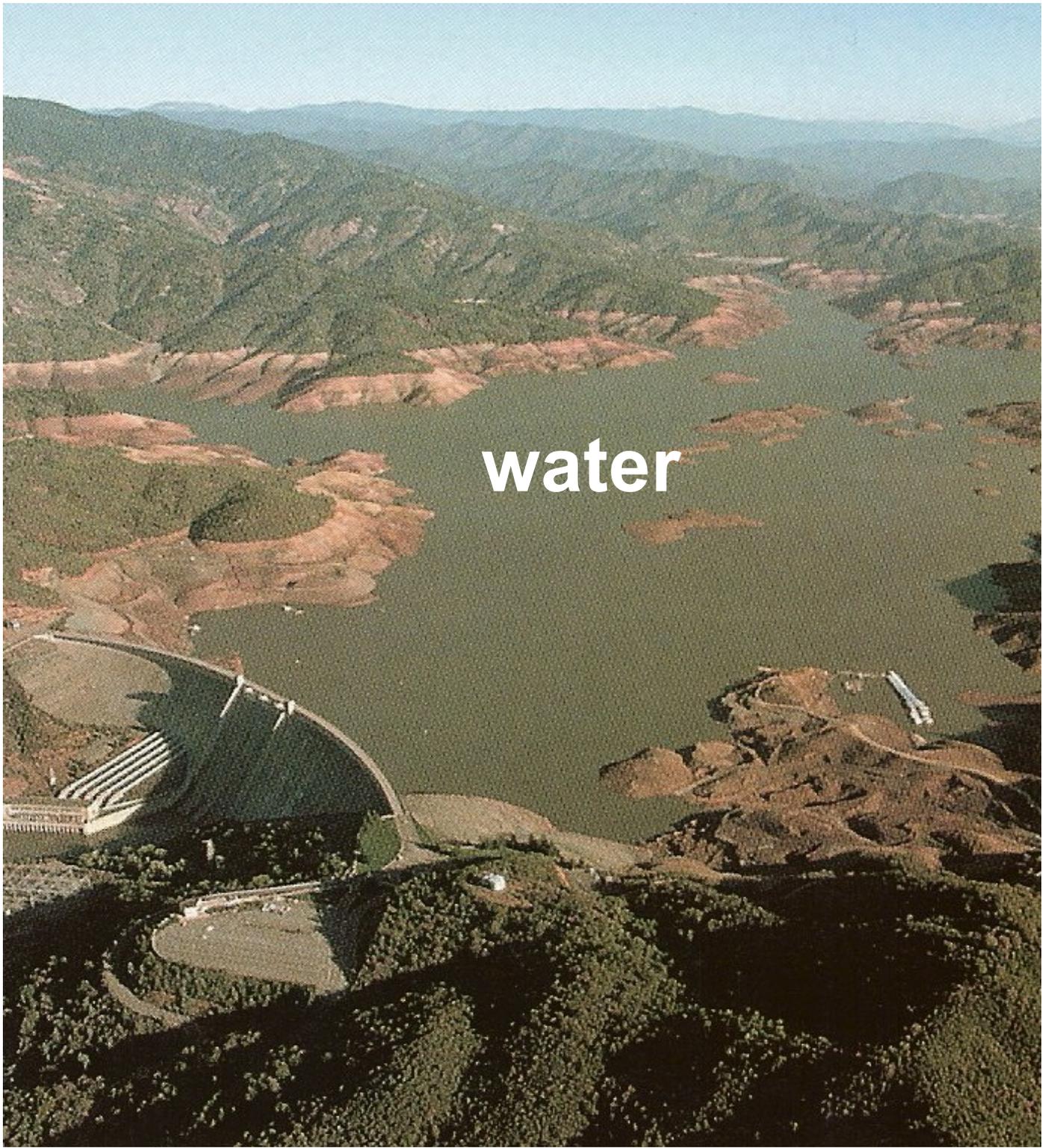
WATER, AIR, EARTH & FIRE



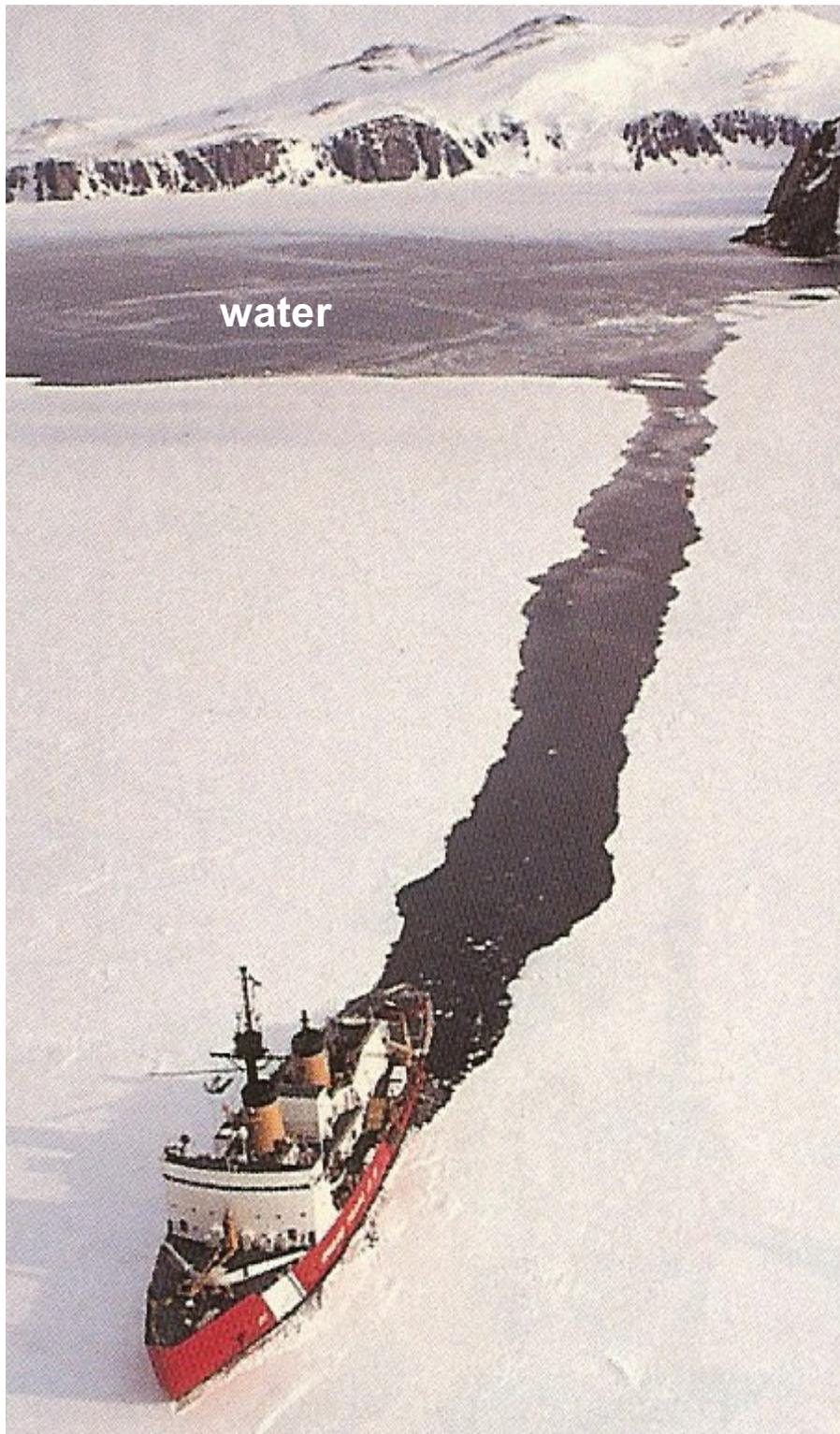
Ron Suter, Melbourne



water



water



water

Antarctic Ice-Breaker

WATER... is a compound

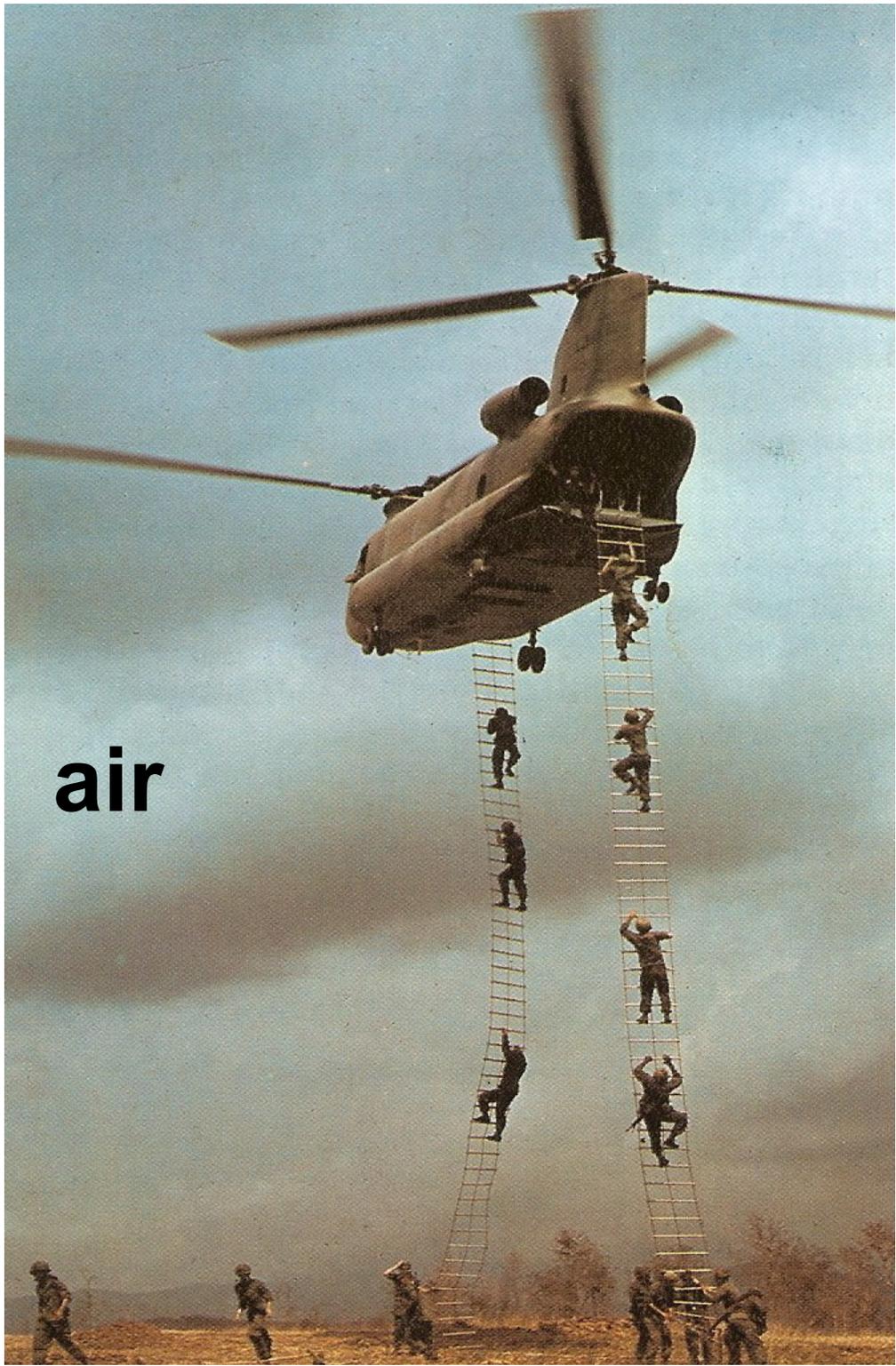
- A compound is a chemical combination of two or more elements. Examples: CO_2 , $\text{C}_6\text{H}_9\text{O}_6$.
- A compound may look quite different from its component elements. Examples: NaCl , H_2O .
- Water (usually a liquid) is a combination of the two gases: hydrogen & oxygen.



**Otto
Lilienthal
1895**



air



air

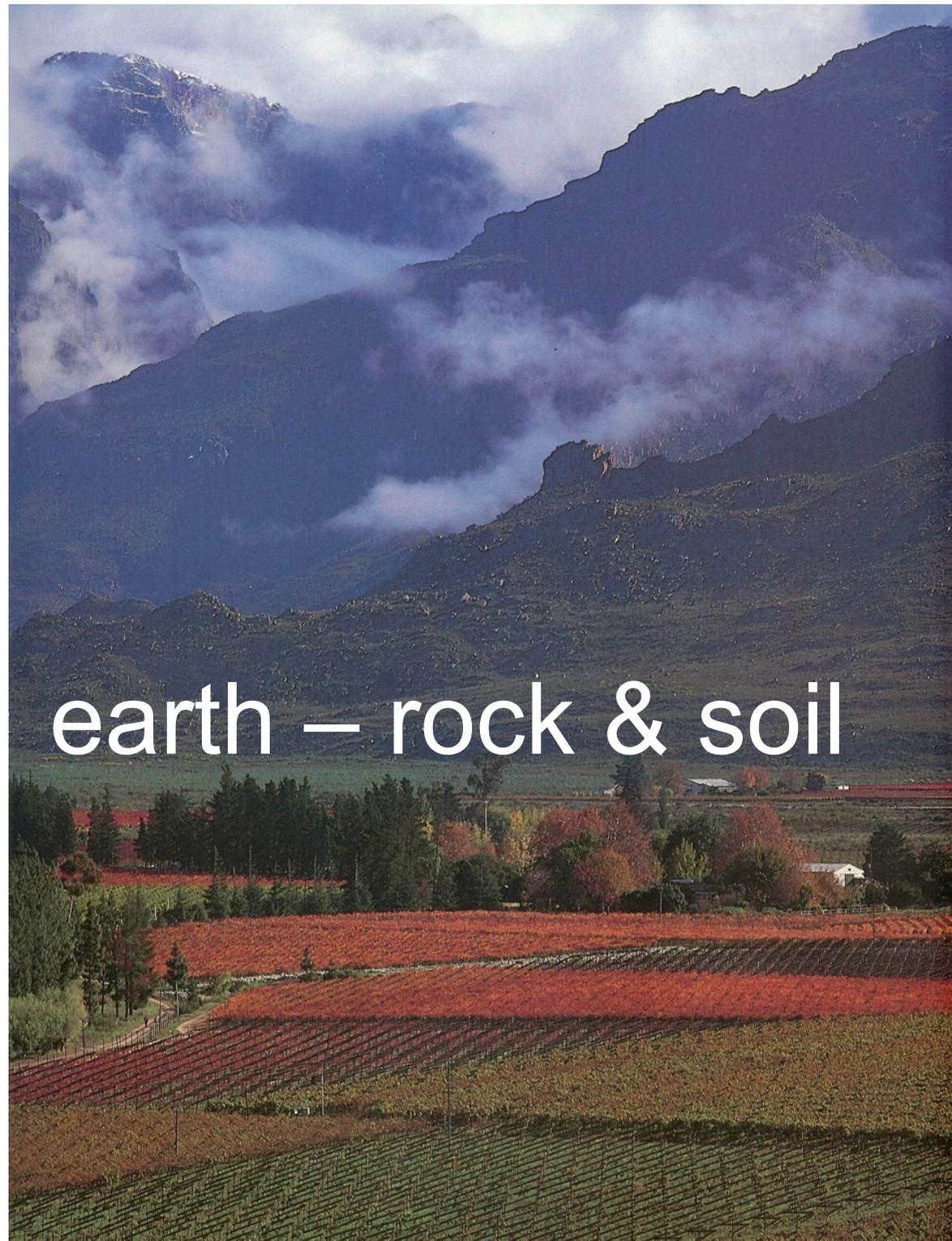
AIR... is a mixture

- About 78% pure nitrogen (gas)
- About 21% pure oxygen (gas)
- About 0.03% pure carbon dioxide
- Other gases, including water vapour, are present in much smaller amounts.



earth - rock

Folded Mountain, Alaska Highway.



earth – rock & soil



earth - soil

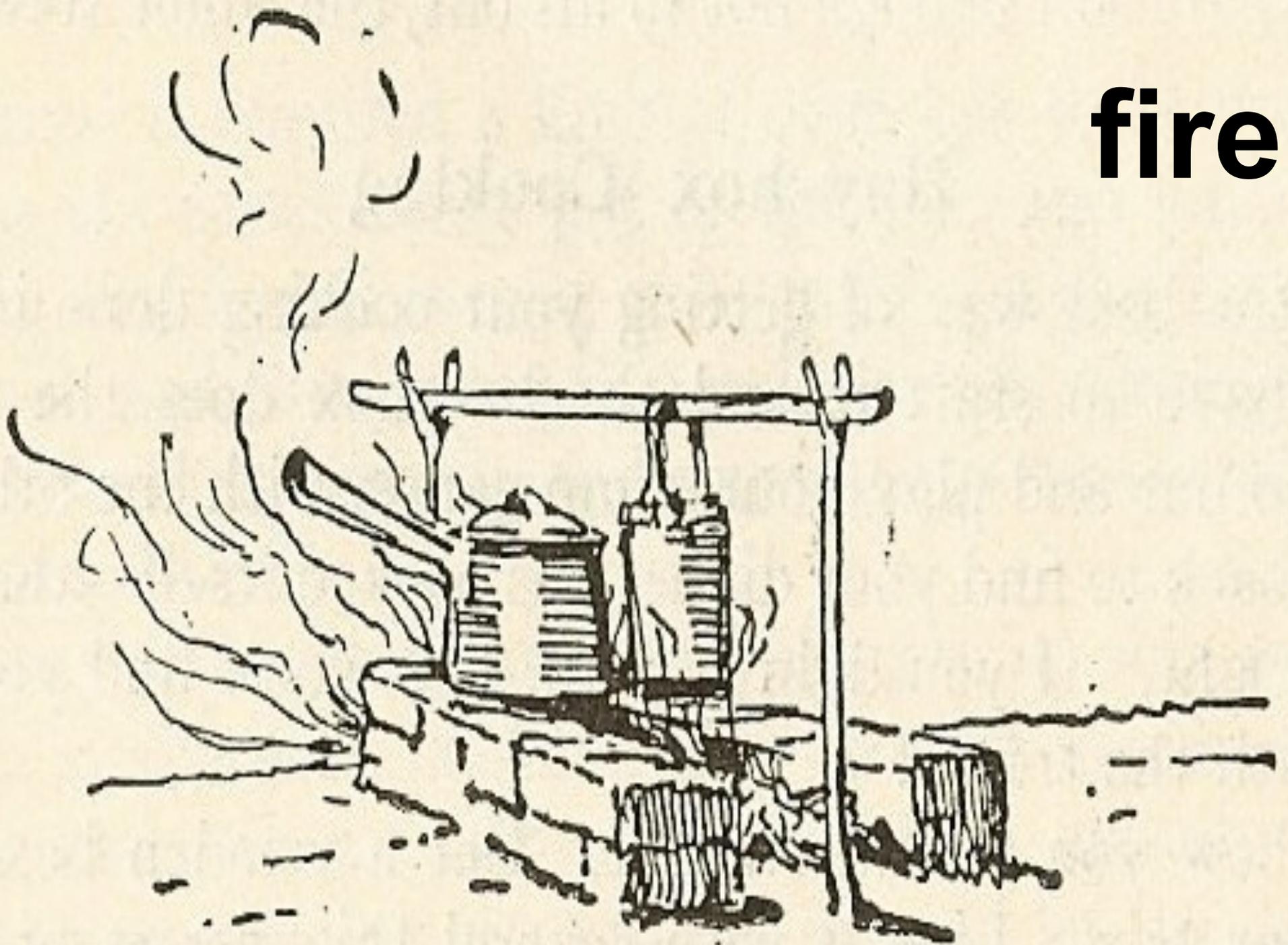
EARTH... is a mixture

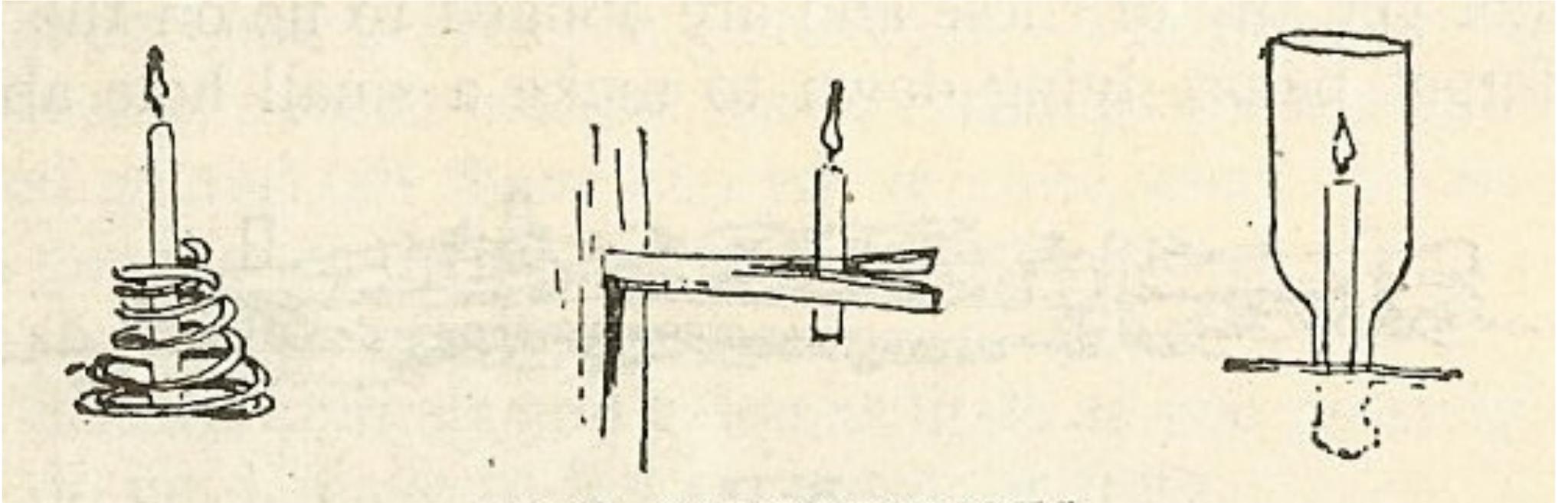
- (Two-thirds of the earth's surface is covered with water, mostly salty water = the oceans.)
- The earth that is “dry land” consists of sands, rocks and soils.
- These sands, rocks and soils are mixtures of various mineral compounds, many of which are useful to mankind.
- The best soils include tiny living things as well as minerals.

Chemical Composition of the Earth's Crust

<u>Element</u>	<u>% in Crust</u>	
oxygen	46.6	Mineral resources consist of fuels, metal-containing deposits, and non-metal deposits.
silicon	27.7	
aluminium	8.1	Coal, petroleum, & gas are the mineral fuels.
iron	5.0	Metal deposits are usually found in combination with other metals or with a non-metal.
calcium	3.6	
sodium	2.8	
potassium	2.6	99% of the earth's crust comprises only 10 elements.
magnesium	2.1	
titanium	0.4	Only 4 (Al, Fe, Mg, & Ti) are industrial metals & only small amounts of these are available for mining.
<u>hydrogen</u>	<u>0.14</u>	The other industrial metals (Cu, Zn, Pb, Sn, Au, Ag) are found in only minute amounts.
copper	0.007	
tin	0.004	
lead	0.0016	The metal deposits are used commercially in trade, building & manufacturing.
silver	0.00001	
gold	0.0000005	The non-metals (O, Si, & H) are used in glass, balloons, and in various chemical compounds.

fire





fire

fire

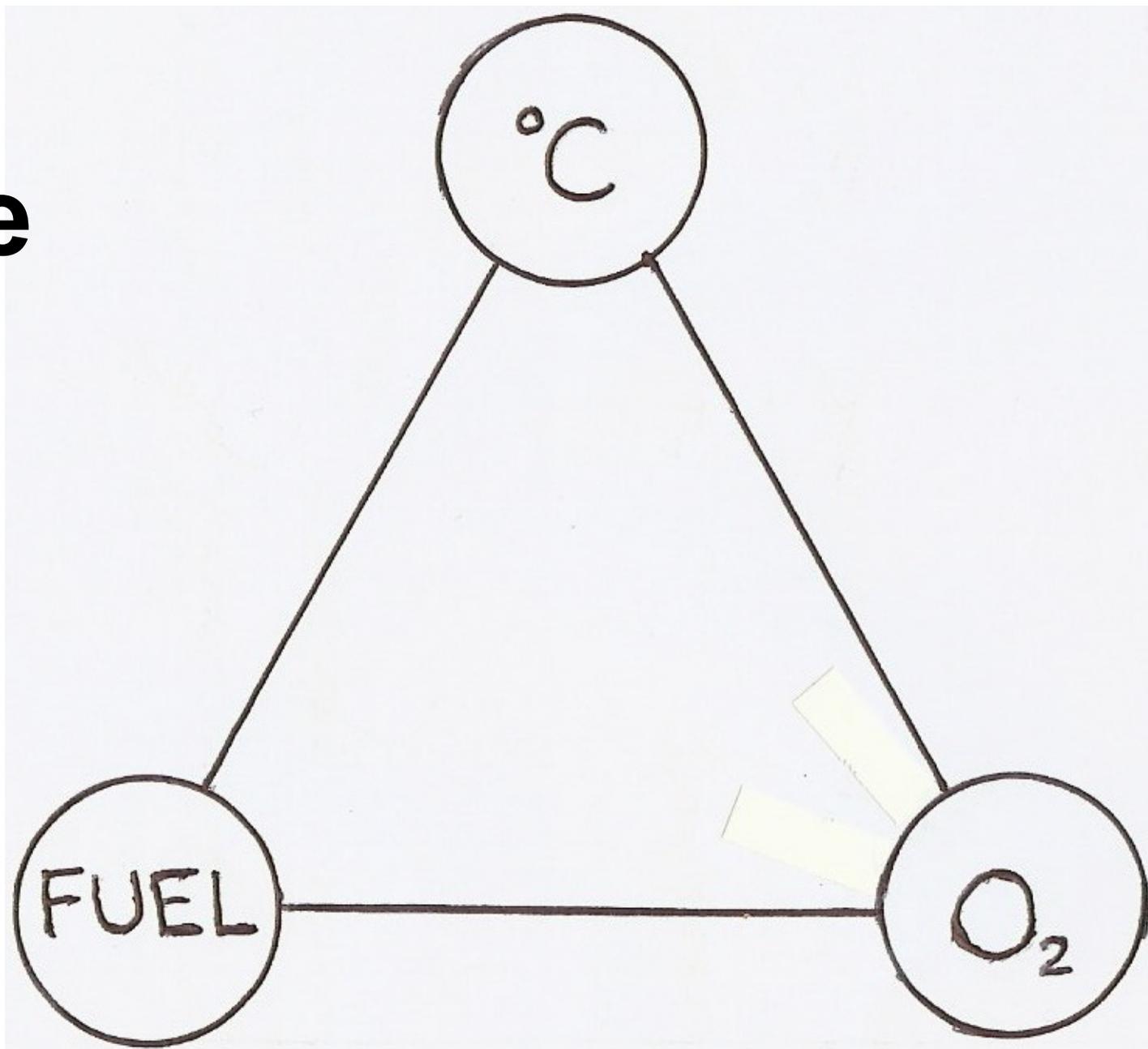


This painting shows the burnt offerings to Shang Di being burnt at the end of the Border Sacrifice Ceremony.
Credit: Altar of Heaven Administration



fire

fire



FIRE... is a process

- Most fuels contain carbon (= C).
- When the ignition temperature of a fuel is reached or exceeded it will start to burn.
- Burning gives off heat and light.
- The burning process allows the carbon to combine chemically with oxygen, thus forming CO₂ and CO.

Objective Science

- Water – a **compound** of two gases.
- Air – the atmosphere, a **mixture** of gases.
- Earth - a **mixture** of solids, mostly compounds, with a few elements.
- Fire – the **process** of combustion: fuel, heat & oxygen are all needed.

Periodic Table of the Elements

1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Unq	105 Unp	106 Unh	107 Uns	108 Uno	109 Une	110 Unn								

- hydrogen
- alkali metals
- alkali earth metals
- transition metals
- poor metals
- nonmetals
- noble gases
- rare earth metals

58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

The Elements in Our Bodies:

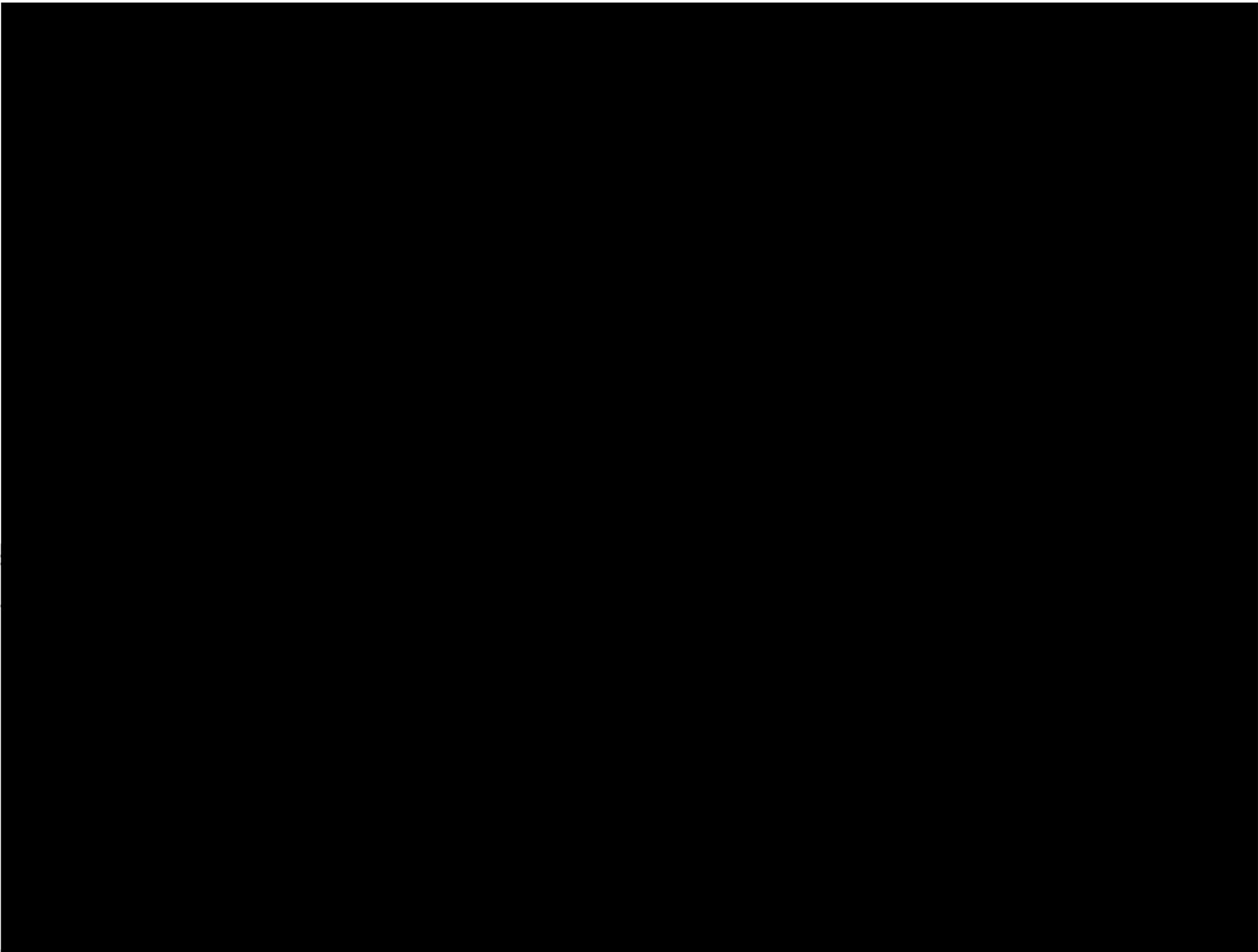
oxygen	O	65%
carbon	C	18%
hydrogen	H	10%
nitrogen	N	3%
calcium	Ca	1.5%
phosphorous	P	1.0%
potassium	K	.35%
sulphur	S	.25%
sodium	Na	.15%
chlorine	Cl	.15%
magnesium	Mg	.05%
iron	Fe	.0004%
iodine	I	.00004%

Plus faint traces of: flourine F
silicon Si
manganese Mn
zinc Zn
copper Cu
aluminium Al
arsenic As

Total, for all materials,
~ \$160 USD;
For "living" tissue,
>45M USD

What is the Price of Salvation??

- “God showed His love for us by sending Christ to die for us while we were still sinners.”
- “For God so loved the world that he gave His only Son, so that whoever believes in Him should not perish but have everlasting life.”
- Romans 5:8; John 3:16.



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