

(1)

condensation :- The process of conversion of vapour into liquid (water) and solid form (ice, snow, frost) is called condensation.

① Latent heat :- Energy in the form of heat is required to convert one state into another state. i.e. to convert 1 gm of ice into water 79 calories energy are required, ~~and~~ whereas 607 calories are needed for conversion of 1 gm of water into water vapour.

∴ This hidden amount of heat energy is known as latent heat.

Humidity Capacity :- Humidity capacity refers to the moisture content of the air that a (air) parcel can hold at a given temp. ~~and~~ as well as at given time & space.

④ Humidity capacity ~~refers~~ decreases from equator to poleward.

⑤ \propto Temp. \uparrow

⑥ Absolute Humidity :- The ~~total weight of a mixture content~~ (water vapour) the actual amount of water vapour present in the air, which is expressed in grams per cubic meter, is called the absolute humidity.

⑦ Specific Humidity :- Specific humidity is defined as the mass of water vapour in grams contained in a ~~kg~~ kg of air and it represents the actual quantity of moisture present in a definite air pressure or air temp.

$$\text{Sp. humidity} = \frac{\text{weight of water vapour [gm]}}{\text{total weight of air [kg]}}$$

⑧ Relative Humidity :- This is the ratio between the actual amount of water vapour and the total amount of the air can hold at a given temp., expressed as a percentage.

$$RH = \frac{AH}{HC} \times 100$$

Saturated air:- When the humidity capacity and Absolute of the air are same, the air is said to be saturated and the relative humidity becomes 100%.

Dew point:- The temp. at which the air gets saturated is known as dew point. At this point water vapour changes into minute droplets of water or ice crystals.

Condensation nuclei:- In the air, tiny particles of matter such as dust serve as surfaces for condensation of water vapour are known as condensation nuclei.

Notes:- If dew point is above freezing point (0°C) then it convert into water form.

If dew point is at or below freezing point, in such cases, dew gets frozen and is called frost.

Cloud:- Condensation of water vapour in the atmosphere result in cloud formation. When moist air is lifted upwards it starts cooling as soon as dew point is reached, the water vapour condenses in the form of ~~water~~ tiny droplets of water or ice crystals. These visible aggregates of minute droplets of water or ice crystals are known as clouds.

① On the basis of appearance (shape), height they are classified into different categories:-

① High clouds (height 6 to 20 km):-

- (i) Cirrus clouds
- (ii) Cirro-cumulus clouds.
- (iii) Cirro-stratus cloud.

② Middle clouds (height 2-5 - 6 km):-

- (i) Alto-stratus clouds
- (ii) Alto-cumulus cloud
- (iii) Nimbo-stratus clouds.

- (v) low clouds (height - ground surface to 2.5 km): -
- (vii) strato-cumulus clouds (viii) stratus clouds (ix) Cumulus clouds.
- (x) Cumulo-nimbus clouds.

Sleet: - it is mixture of snow and rain. sleet means falling of small pellets of transparent or translucent ice having a diameter of 5 mm or less.

Hail: - Hail consists of ~~large~~ large pellets or sphere of ice. When the coating of water is frozen in a concentric layer about the original nuclei.

Drizzle: - The fall of numerous uniform minute droplets of water having diameter of less than 0.5 mm is called drizzle.

Fog: - it is microscopically small drops of water condensed form and suspended in the air near the earth surface and reduce visibility.

- ⑩ Smog: - fog + smoke \Rightarrow Sometime it becomes poisonous.
- ⑪ Mist: - it is formed when visibility reduced between 1-2 km
- Haze: - it limits the visibility under 2 km but over 1 km.

Smaze: - it is an admixture of smoke and haze.

Adiabatic change of temp.: - Increase or decrease of temp. of air parcel without addition or subtraction of heat from outside is known as adiabatic change of temp.

The value of α

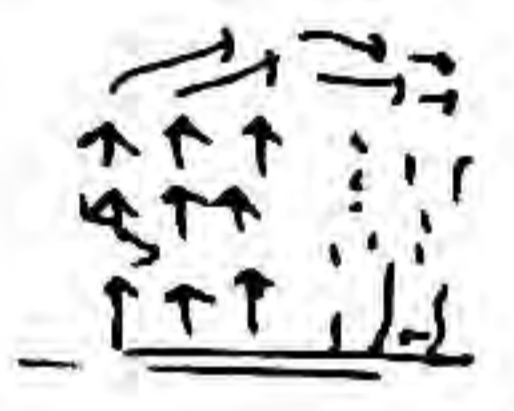


- Normal lapse rate = $6.5^\circ\text{C}/1000\text{m}$ or $3.6^\circ\text{F}/1000$
- dry adiabatic lapse rate = $10^\circ\text{C}/1000\text{m}$ or $5.5^\circ\text{F}/1000$
- Moist adiabatic lapse rate = $6^\circ\text{C}/1000\text{m}$ or $3^\circ\text{F}/1000\text{feet}$

Rainfall :- fall of water droplets ~~which~~ from air (which suspends in the air) on the ground surface is known as Rainfall.

There are 2 theory of Rainfall :- given by Bergeron

- Ice crystal Theory or cloud instability Theory
- Collision Theory & Coalescence Theory
L. E. B. Bowen
modified by Longmire

types of Rainfall :-

- Convective rainfall  ex:- in equatorial over afternoon rainfall is
- orographic rainfall  ex:- Shimla, west coast of India in USA
- cyclonic or frontal rainfall  ex:- rainfall in subtropical region.

Note:- Rainfall in Mangalore = 200 cm

- Bangalore = 50 cm
- Shimla = 152 cm
- Nainital = 200 cm
- Doozuling = 315 cm
- Patna = 100 cm
- Delhi = 65 cm
- Allahabad = 105 cm

- Mahabaleshwar = 600 cm (in west coast)
- Pune = 70 cm

Distribution of Rainfall (world):-

① Regions of high rainfall (more than 200 cm per year)

- ↳ Equatorial regions of Africa, South America, Southeast Asia.
- ↳ western coastal regions of Middle latitudes in west - Europe and North America.

② Regions of Moderate rainfall (100-200 cm per year):-

↳ East Brazil, East China, Southeastern U.S. are example of Moderate rainfall.

③ Regions of low rainfall :- (less than 25 cm per year):-

Regions of extremely low rainfall are known as deserts. These are classified into three major types:-

- ① tropical desert - California (U.S.), Sahara, Arabia, west Australia, Kalahari in south-west Africa, Atacama in South America are example of hot deserts.

② Interior regions of large continents

↳ Tibet, Iran (rain shadow area which is surrounded by Mt.).

③ cold desert:-

↳ Patagonia, Gobi (Mongolia) (Argentina)

Note: ① The instrument for measuring relative humidity is the hygrometer.

- ② Wind direction is measured with wind vane or weather clock.
- ③ The speed of wind is usually measured by anemometer.
- ④ The sunshine observation is recorded by a sun-dial. On map places with equal sunshine duration are joined by isohels.
- ⑤ The instrument which measured accurately pressure is known as aneroid barometer.
- ⑥ The instrument which measured rainfall is known as rain gauge. The places having same mean annual rainfall is known as isohyet.

Airmasses :- An airmass may be defined as large body of air whose properties, especially temp., moisture content, and lift rate are more or less uniform horizontally.

① An airmass is designated as cold airmass when its temp. is lower than the underlying surface.

✓ While an airmass is termed warm airmass when its temp. is higher than underlying surface.

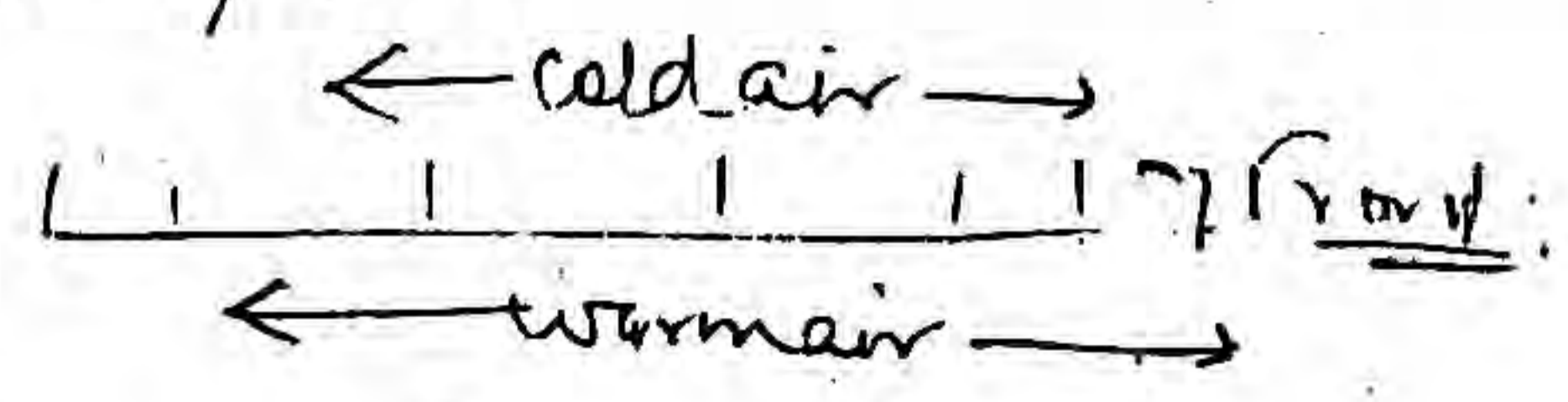
② Front :- A front is sloping boundary which separates two opposite airmasses having contrasting characteristics in terms of air temp., humidity, density, pressure and wind direction.

③ frontogenesis :- Formation of ~~front~~ new front or the regeneration of decaying front already in existence.

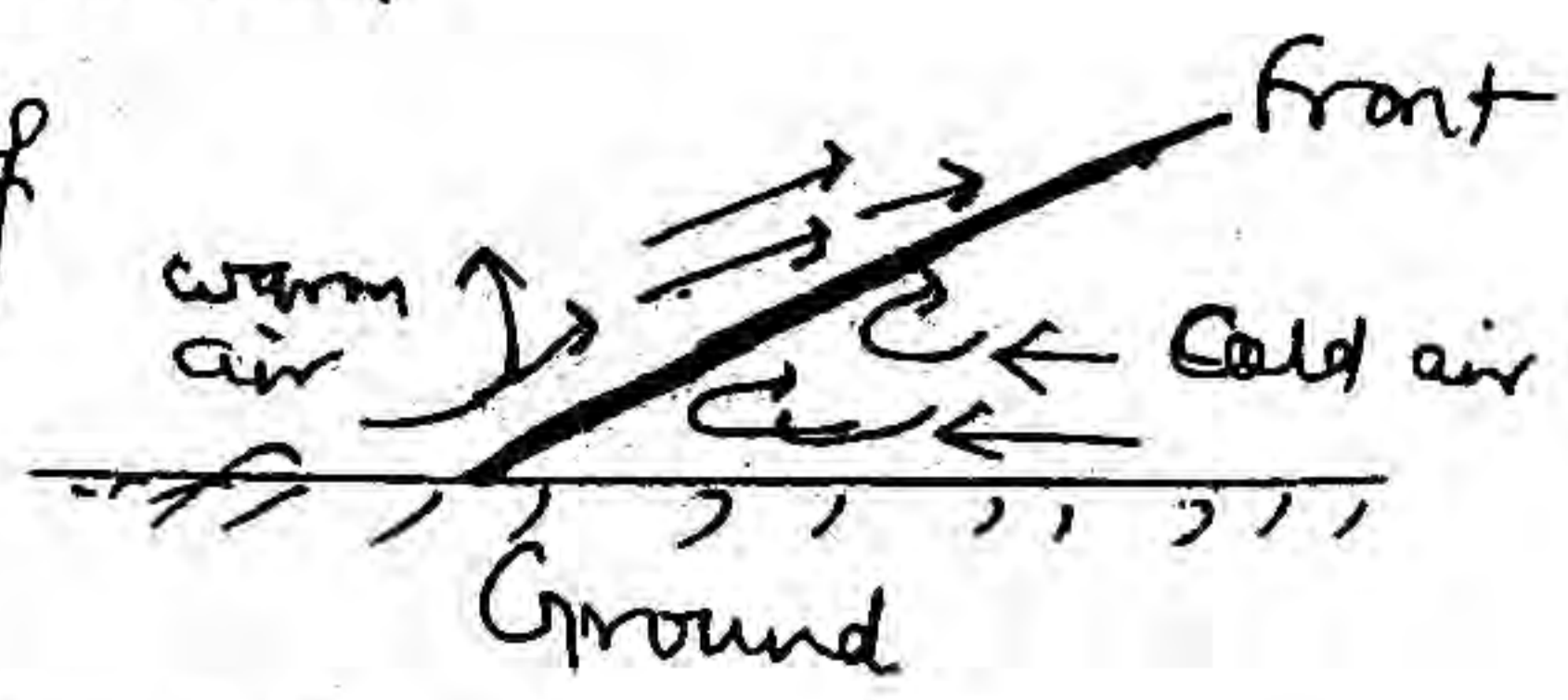
frontolysis :- The process of destruction or dying of fronts is called frontolysis.

types of front :-

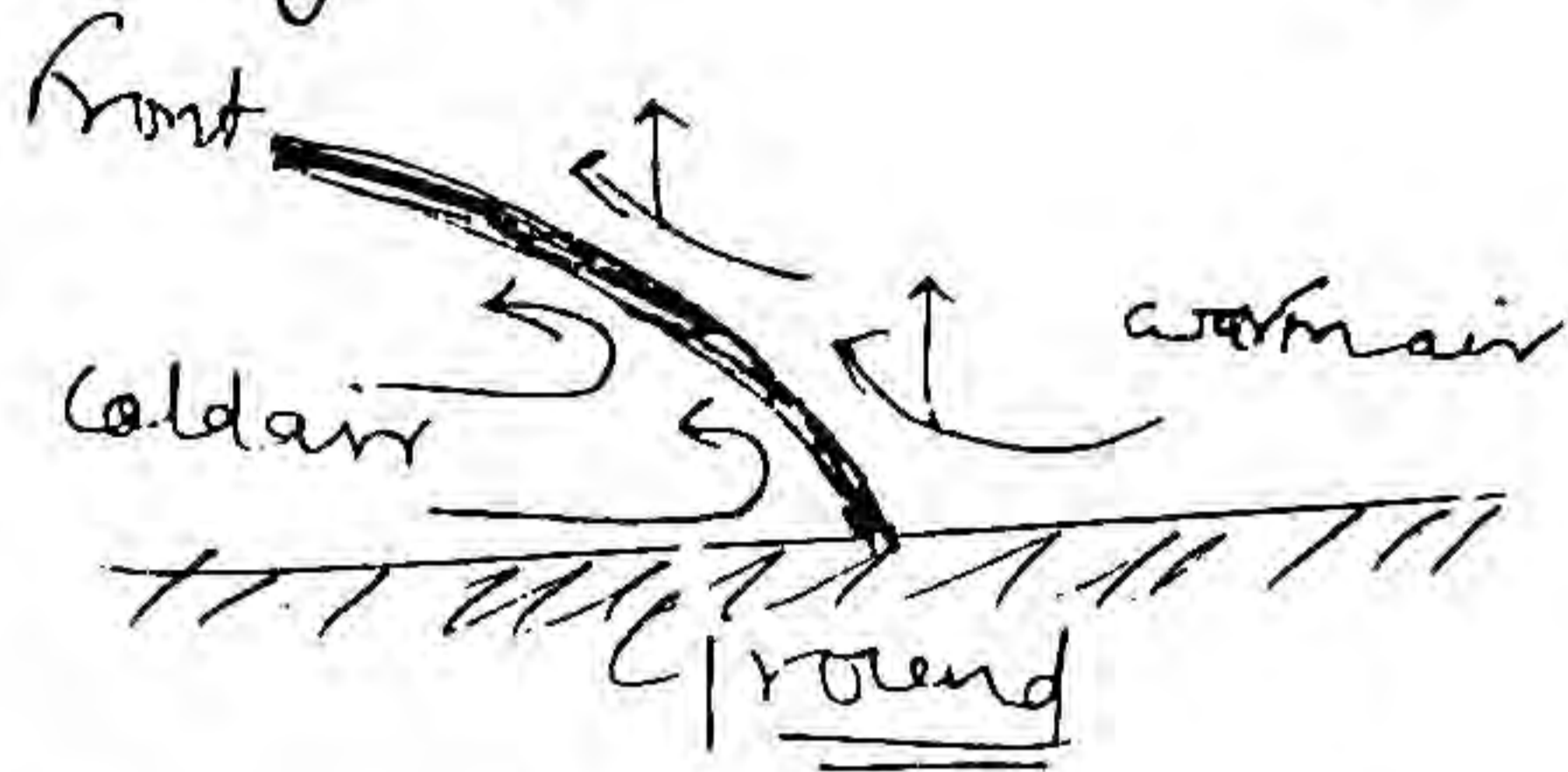
① Stationary front :- when two contrasting airmasses converge in such a way that they become parallel to each other and there is no ascent of air.



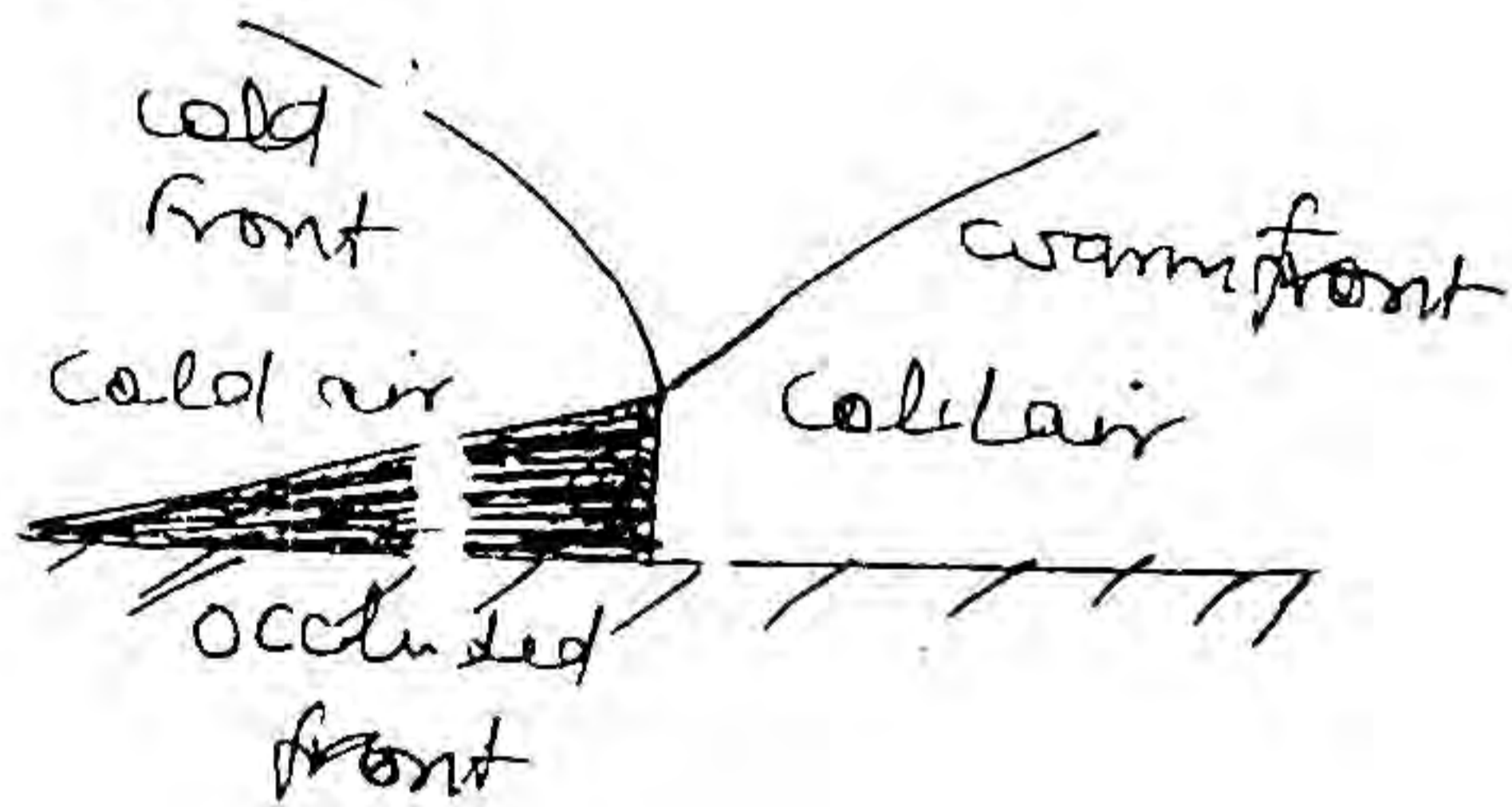
② Warm front :- warm front is that gently sloping frontal surface along which warm and light air becomes active and aggressive and rises slowly over cold and dense air.



Cold front :- Cold front is that sloping (boundary) frontal surface along which cold air becomes active and aggressive and invades the warm air territory and being denser remain at the ground but forcibly uplifts the warm and light air.

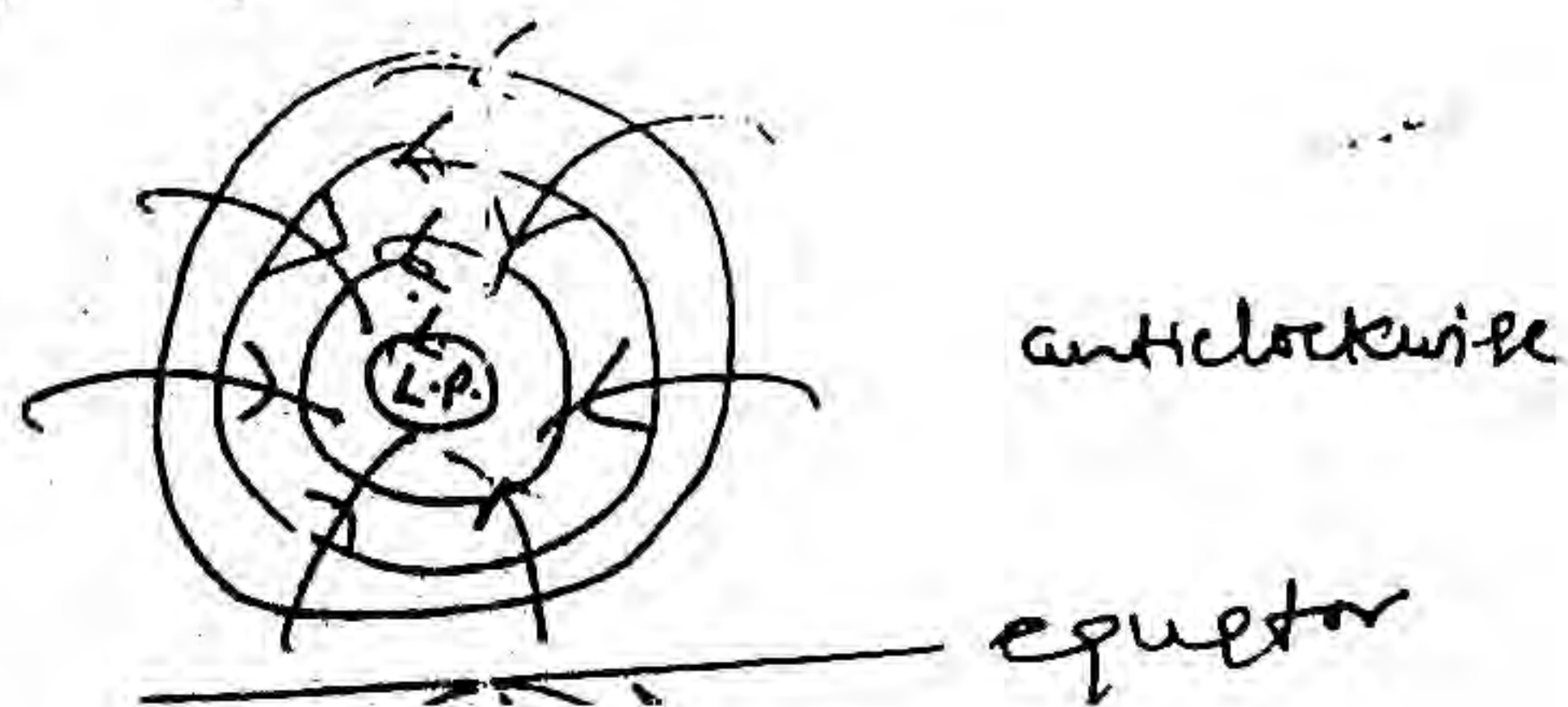


④ Occluded front :- Occluded front formed when cold front overtakes warm front and warm air is completely displaced from the ground surface.

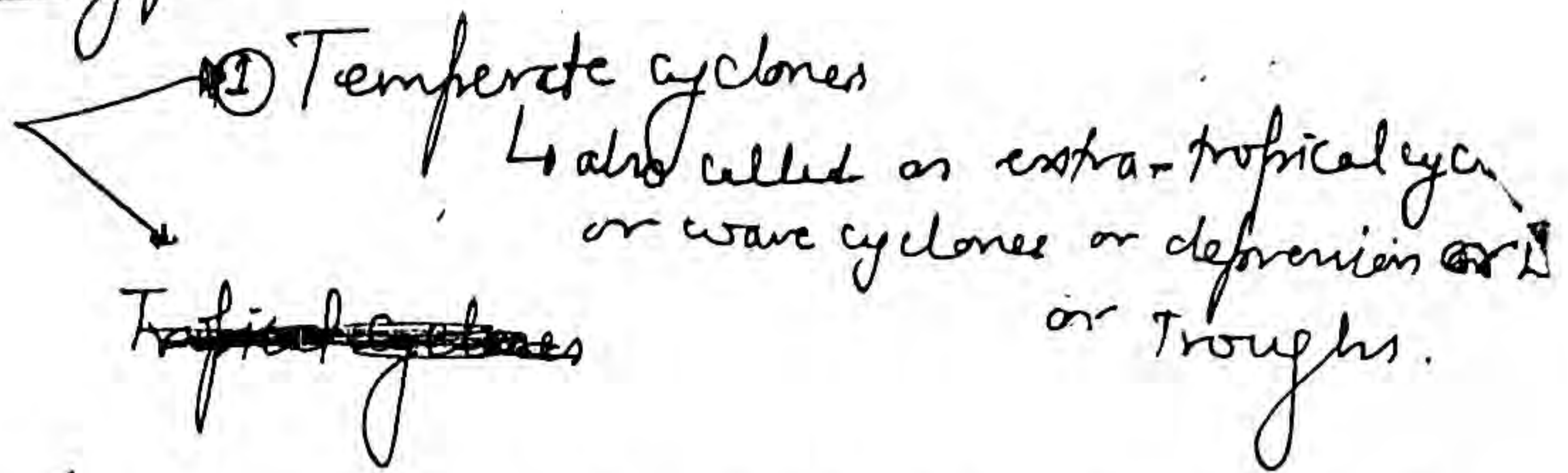


Cyclones

Cyclones are centres of low pressure surrounded by closed isobars having increasing pressure outward and closed air circulation from outside towards the central low pressure in such a way that air blows inwards in anticlockwise in northern hemisphere and clockwise in southern hemisphere. AN

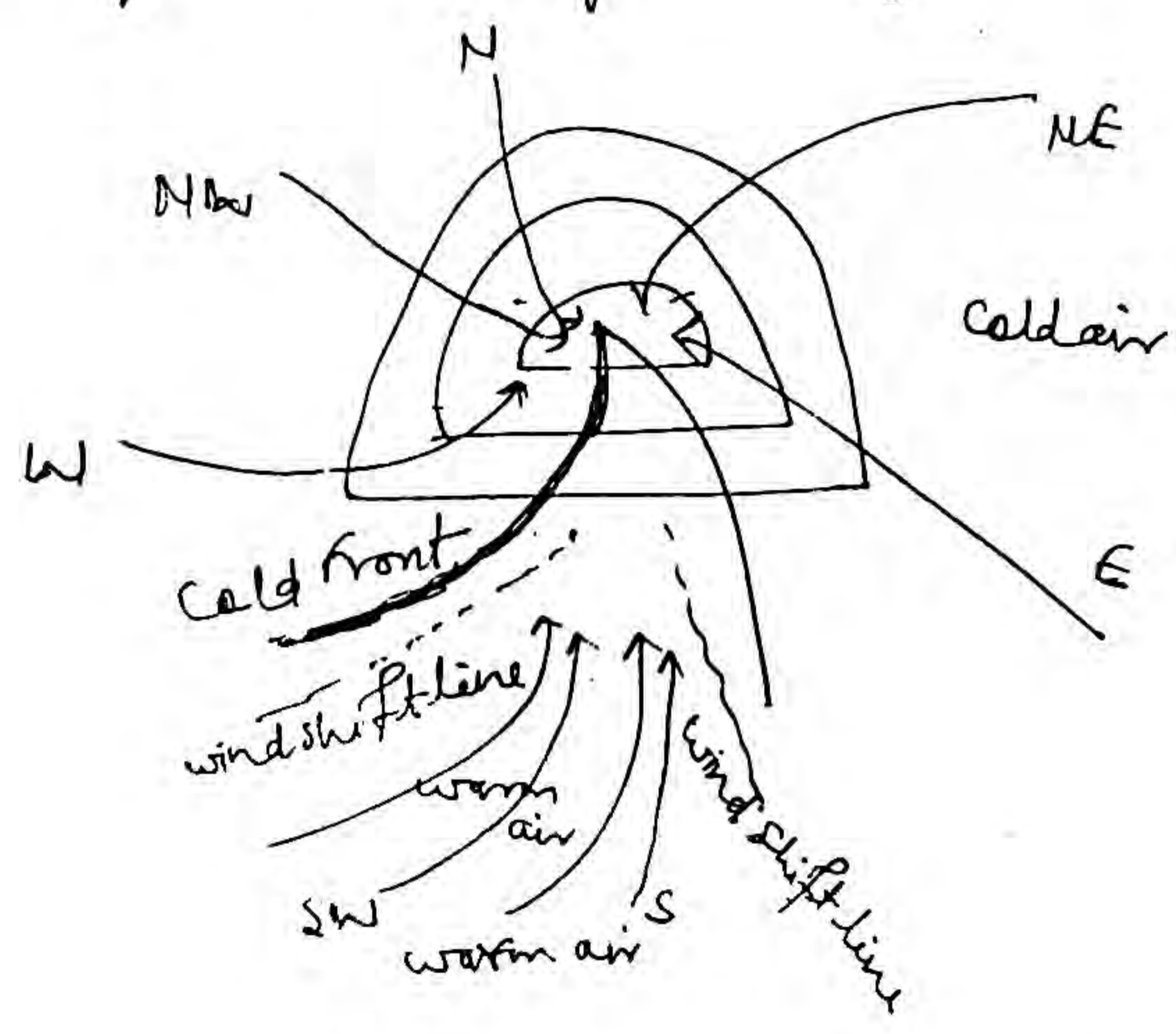


Cyclones are of two types

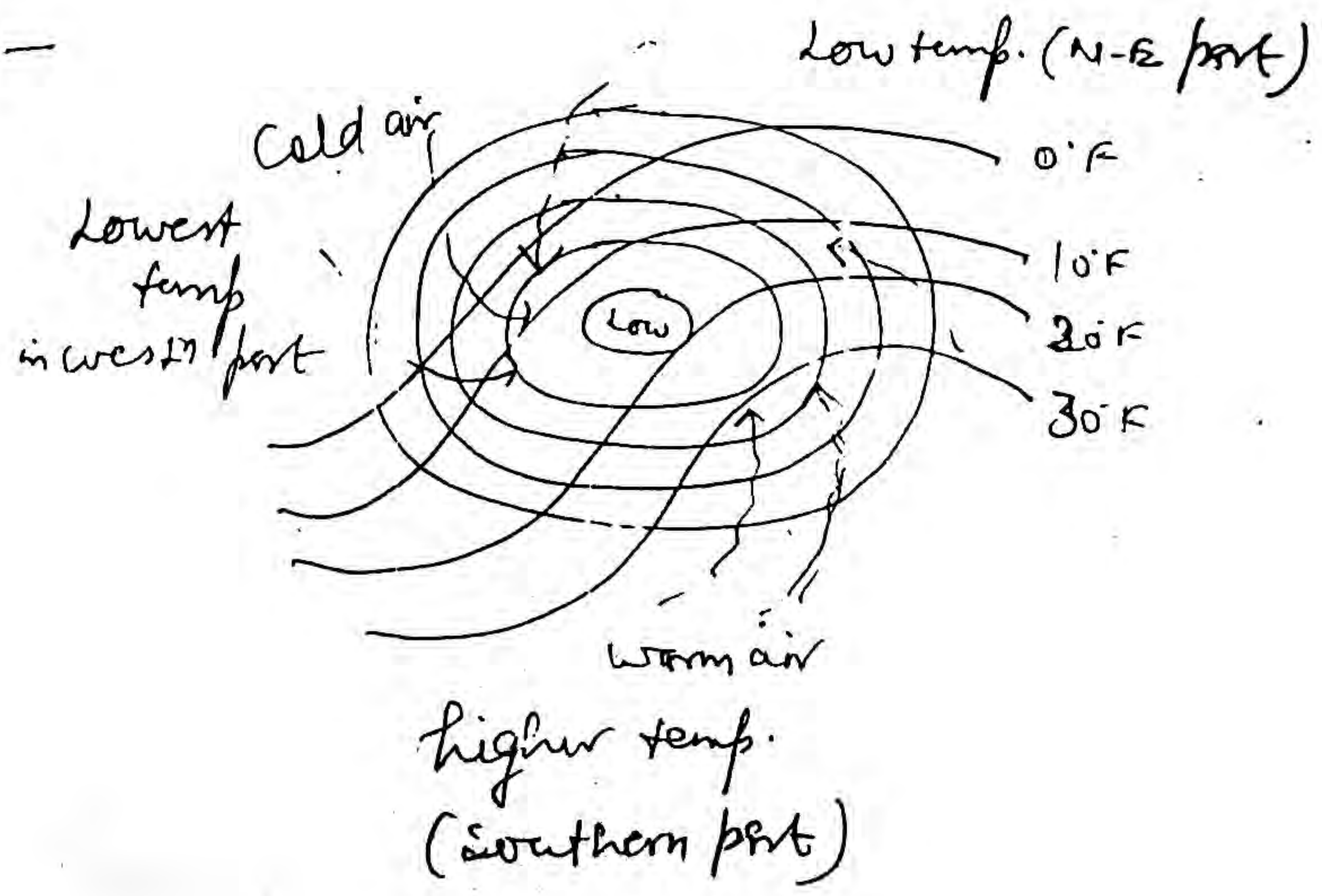


② Shape of temperate cyclones could be Circular, semi-circular, elliptical, elongated or V-shaped.

③ Island system in temperate cyclones

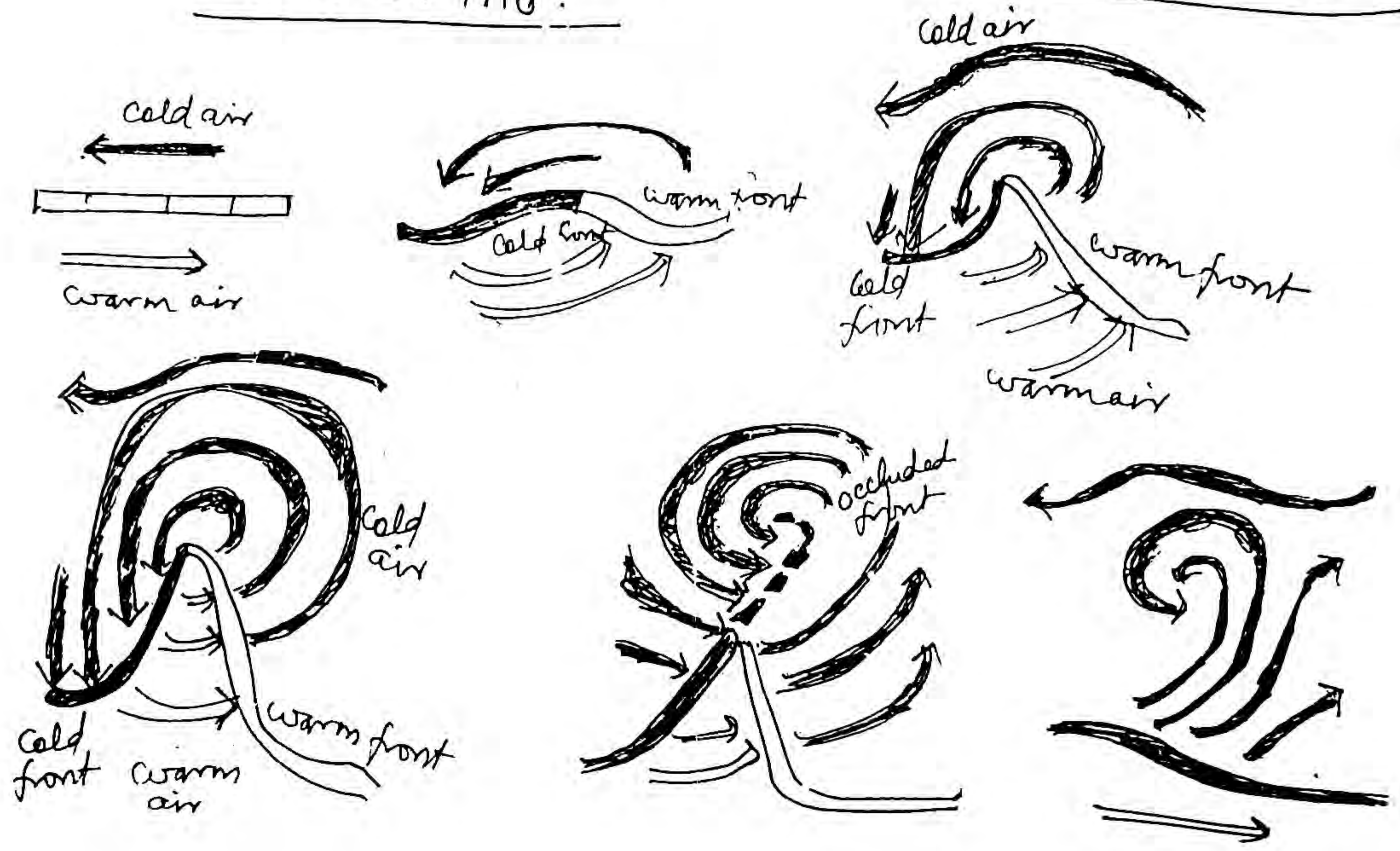


④ Temperature :-



Origin of cyclones:-

↳ Polar front Theory is also called frontal theory or wave theory or Bergen Theory as propounded by V. Bjerknes and J. Bjerknes in 1918.



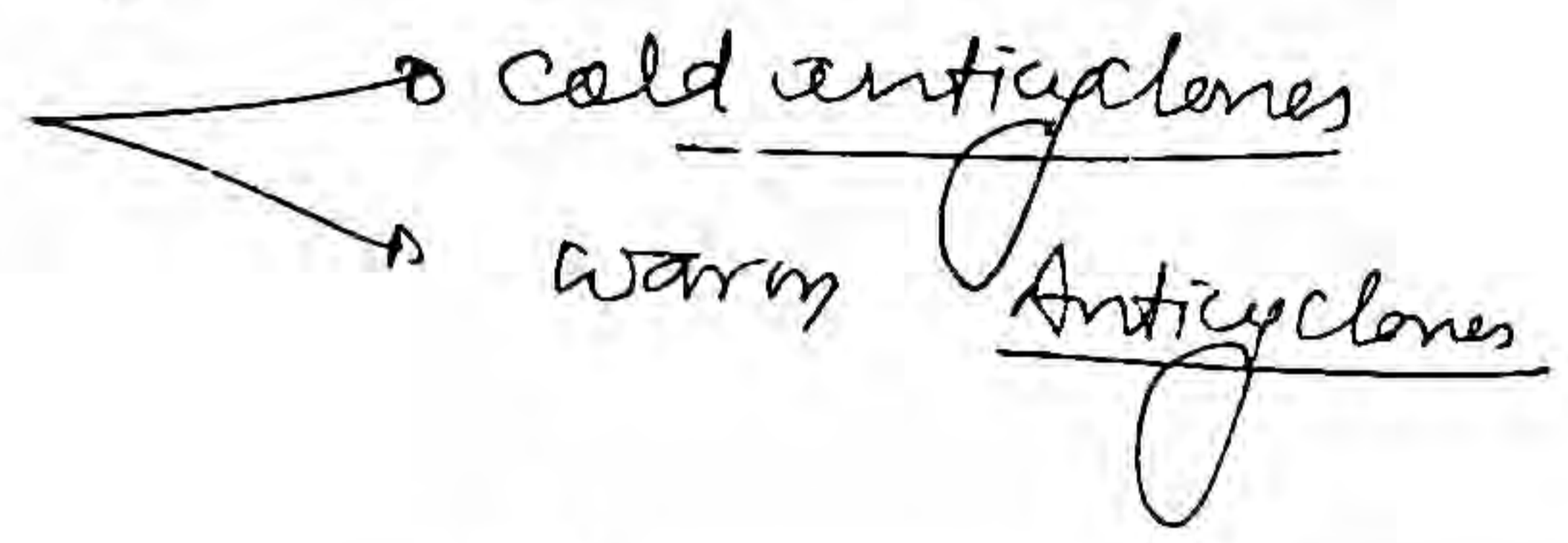
Tropical cyclones:- Tropical cyclones developed in the regions lying between the tropics of Capricorn and Cancer are called tropical cyclones.

- ⊙ Tropical cyclones are not regular and uniform like extra-tropical or temperate cyclones.
- ⊙ Tropical cyclones do not develop in between ~~5°-8° N/S~~ ~~0°-(5°-8°) N/S~~.
- ⊙ Local names of tropical cyclones are:-
 - Hurricanes - USA
 - Typhoons - China
 - Willy-willy - Australia
 - Cyclones - India ocean
 - Southern Bursters - Australia
 - Baguio - Phillipines.
 - TaiFu - Japan.
 - Tornado - Southⁿ USA and eastⁿ USA.

Anticyclones :- surrounded by circular isobars anticyclones is such a system which has highest air pressure at the centre and lower the outer margin and wind blow from the centre outward clockwise direction in Northern hemisphere and anticlockwise in Southern hemisphere.

① Anticyclones are usually circular in shape but sometimes it also assume V-shaped.

② Anticyclones have no fronts.



classification of climates and climatic types

Purpose of climatic classification is to give generalisation of world's climate.

① There are three Methods to classify world's climate :-

- (i) Empirical basis
- (ii) genetic basis
- (iii) Quantitative basis

② Some imp. classification are :-

- Ⓐ Koepfen's climatic classification
- Ⓑ Thornthwaite " "
- Ⓒ Trevarthy " "

Koepfen's climatic classification

koepfen used five major vegetation zones of the world as identified by Candolle —

- (i) Mesotherms.
- (ii) Thermophytes
- (iii) Mesotherms
- (iv) Microtherms
- (v) Heliotherms

Based on these five vegetation zones Koepfen divided the world climates into 5 principal types and designated them by capital letters A, B, C, D and E.

A:- Tropical rainy climate with no cool season. Temp. of the coolest month above 10°C

B:- Dry climate in which there is an excess of evaporation over ppt.

C:- Middle-latitude rainy climate with mild winters. Average temp. of coldest month below 18°C but above 3°C. Average temp. of warmest month over 10°C

D:- Middle-latitude rainy climate with severe winters. Average temp. of coldest month below -3°C and that of warmest month above 10°C

E:- Polar climate with no warm season. Average temp. of the warmest month below 10°C

Thornthwaite's climatic classification :-

He uses ppt effectiveness and thermal effectiveness to classify world climate.

(i) On the basis of ppt effectiveness, he identified 5 Zones :-

Humidity Zones	Vegetation	P/E Index
A (Wet)	Rainforest	127
B (Humid)	Forest	64-127
C (Subhumid)	Grassland	32-63
D (Semiarid)	Steppe	16-31
E (Arid)	Desert	< 16

(ii) On the basis of thermal effectiveness :-

Temperature province	P-E Index
A' - Tropical	127
B' - Mesothermal	64-127
C' - Microthermal	32-63
D' - Taiga	16-31
E' - Tundra	1-15
F' - Frost	0

*) Later he used potential evapotranspiration (PE) and modified his classification of 1931.

*) Potential evapo-transpiration :- It represent the amount of transfer of both moisture and heat to the atmosphere from soil and vegetation (evaporation of liquid or solid water, and transpiration from living plant leaves).

f = Equatorial climate or tropical Rainforest climate

↳ In this nights are called winters of the tropics.

- ↳ Creeper or climber vegetation
- ↳ climber kn as Liane
- ↳ epiphytes

↳ vertical stratification of vegetation. Community consists of 5 layers:-

- First or Top layer or dominant layer (30-60m)
- Second layer or Co-dominant layer (25-30m)
- Third layer of smaller tree (12-20m)
- 4th layer of shrubs
- 5th layer (ground layer)
 - ↳ herb & ferns.

Am:- Monsoon climate

Aw:- Savanna climate

↳ This is also kn as Sudan type of climate.

The most characteristics areas of Savanna climate include the Llanos of Orinoco (Venezuela & Columbia), Campos of Brazil (central part).

① Savanna region of Brazil, locally called as Cerrado

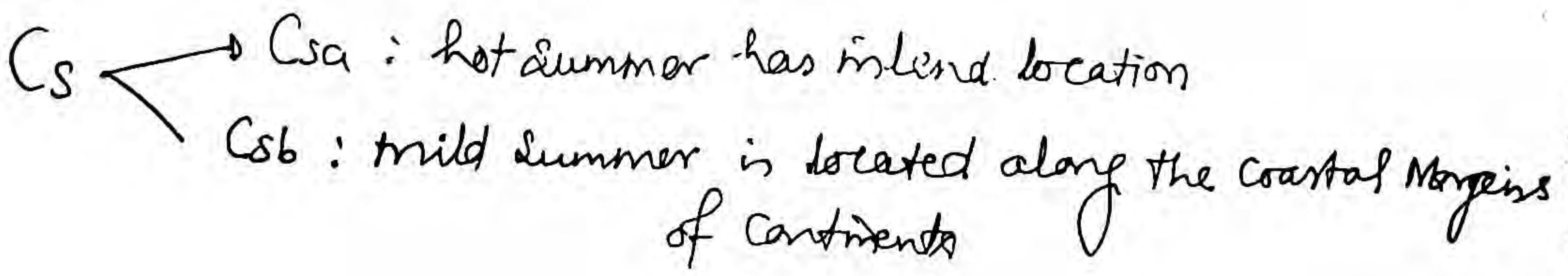
② Savanna vegetation is divided into 4 types:-

- ① Woodland Savanna
- ② Tree Savanna
- ③ Shrub Savanna
- ④ Grass Savanna.

BWh:- Tropical-Subtropical Hot desert climate :-

- ↳ Sahara type of climate
 - ↳ Africa → Namib, Kalahari
 - ↳ Asia → Thar desert of India & Pakistan, Arabian desert, Iranian desert.
- ↳ South America → Atacama desert of Coastal Peru and Chile.
- ↳ Mojave and Arizona desert of South-western USA
- ↳ Australia - Great sandy desert, Great Victoria and Tanami Desert

Cs: Mediterranean climate :- The Medⁿ climate or biome is also kn as - Sclerophyll Ecosystem or Biome because of the development of special features and characteristics in the dominant tree and shrubs to adapt to the typical environmental conditions of the climate - dry ~~and~~ summer and wet winter.



Natural vegetation :- Maquis or garigue → Southⁿ Europe
~~Mare~~ Chaparral → in California
 fynbos or fynbosch → in South Africa
 mallee scrub → Australia.

Ca:- CHINA Type Climate :-
 ↳ Also kn as Sub-Monsoon climate, because of its near similarity with monsoon climate.