HANDOUT

BAHASA INGGRIS

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TOPIK 1

In topic 1 you will learn about vocabulary, text and exercise The Laying Habits of European Cuckoo.

THE LAYING HABITS OF EUROPEAN CUCKOO

VOCABULARY

[Scientific words used in the Text arid elsewhere that are not explained in this vocabulary may be found in the general vocabulary on p. 205 or in the glossary of biological names on p. 218.]

***acute* / ə 'kju:t/** 29 keen, sharp: `acute controversy]'

alight / ə 'lait/ 16 to land: `She . . . quickly alights in it [= the nest]'

***aperture* /'æpətfa*/** 24 an opening: `The egg is then forcibly↓, projectedl into the aperture'

***at random* /æt 'rændəm/** 66 without selection: `others fail to establish a territory and have to lay at random in a wide variety of nests'

***cloaca* /klo'eikə/** 24 the end portion of the gut (containing the openings of the urinary and genital ducts in all vertebrates except mammals: `The egg is then forcibly↓ projected↓ into the aperture↑' from the bird's cloaca'

***clutch* /klΛtʃ/** 14 the set of eggs laid by a bird: `providing↓, their clutch is incomplete'

***compel* /kəm'pel/** 64 to force: `a cuckoo↓ is compelled to lay in any nest she can find'

***conjecture* /kan'd3ektʃə*/** 88 guess-work, guessing: `But this is pure conjecture'

***controversy* /'kontrəvə:si, kan'trovasi/** 29 a dispute, a discussion in which people have strong opinions: `Whether this sometimes happens is a matter of acute↑ controversy'

***cuckoo* /'kuku:/** 1 *Cuculus canorus*, the European cuckoo

dispose of /dis'pouz ov/ 21 to get rid of: `Sometimes she carries one a considerable distance in her beak before disposing of it'

***domed* /doumd/** 22 with a circular arched roof, or dome: `a small
domed nest'

***eccentric* /ek'sentrik/** 65 of abnormal behaviour: `some cuckoos↑ are eccentric'

***excite* /ek'sait/** 9 to stimulate: `The visual↓, stimulus thus received appears to excite ovulation↓.'

***favour* /'feivə*/** 6o to prefer, to have as a favourite: `The number of eggs laid by individual cuckoos↑ depends to a certain extent on the species of host↓ favoured'

***feat* /fi:t/** 40 the performance of a difficult act: `There are, however, rarely enough nests available in a single territory to make such a feat possible'

***foist* /fəist/** 87 to get rid of [something unwanted *upon* someone else] : `stimulates the female cuckoo↑ to foist her eggs upon them'

***forcibly* /'fo:sabli/** 24 by the use of force: `The egg is then forcibly projected↓ into the aperature↑ from the bird's cloaca↑'

***fosterer* /'foəstəra*/** 6 a foster parent, or adult animal which feeds and looks after young which are not its own: `observing the behaviour and movements of the future fosterers'

***gens, pl. gentes* /genz, 'genti:z/** 48 a strain.: `strains↓ or "gentes" of the European cuckoo' (L. a clan)

***glide* /glaid/** 15 to fly without flapping the wings : `She glides over the selected nest'

***great spotted cuckoo* /'greit'spotid 'kuku:/** 44 the bird *Clamator glandarius habitat*

***habitat*/'hæbitæt/** 85 a place inhabited by an organism or organisms

***hedge-sparrow* /'hed3 spærou/** 51 the bird *Prunella modularis*

***host* /houst/** 6o an animal or plant which is parasitized↓,: `The number of eggs laid by individual cuckoos↑ depends to a certain extent on the species of host favoured↑,'

***hover* /'hovə*/** 25 to remain in the same position in the air: `[the bird] hovers immediately↓ over the nest'

***immediately* /i'mi:djətli/** 25 See Explanatory Notes, p. 69

***initial* /i'niʃl/** 72 first: `her initial laying'

***linnet* /'linit/** 3 the bird *Carduelis cannabina*

***locate* /lo'keit/** 4 to discover where somebody or something is: `When she locates a pair [of birds] building'

***meadow pipit* /'medou 'pipit/** 38 the bird *Anthus pratensis*

***on occasion* /on ə'kei3an/** 42 occasionally, now and then: 'On occasion she will destroy a whole clutch↑'

***overwhelming* /,ouvə'welmiŋ/** 68 much the greater in number or force: `the overwhelming majority of cuckoos↑'

***ovulation* /,ovju'leifan/** 9 the liberation of the ripe egg, or ovum /'ouvəm/, from the ovarian follicle */o* Vɛərian 'folikl/, whence it passes into the oviduct /'ovidʌkt/: 'The visual↓, stimulus thus received appears to excite↑, ovulation'

***parasitize* /'pærəsitaiz/** 37 to be a parasite /'pmrasait/ upon: 'One female parasitizing meadow-pipits↑ has been known to lay twenty-five eggs in one-season'

***passerine* /'pæsəri:n/** 2 n. and adj./a member of the *Passeriformes,* the perching birds, which have feet with three toes in front and one behind: 'small passerine birds' (L. *passer* a sparrow)

***pied flycatcher* /'paid 'flaikætʃə*/** 56 the bird *Muscicapa lypoleuca* See Explanatory Notes, p. 70

***pied wagtail* /'paid 'wægteil/** 51 the bird *Metacilla alba See* Explanatory Notes, p. 69

***plumage* /'plu:mid3/** 83 a bird's feathers: `the plumage and song of birds'

***project* /pro'd3ekt/** 24 to impel: `The egg is then forcibly↑ projected into the aperture↑'

***prolonged* /pro'loŋd/** 5 continuing for a long time: 'a careful and prolonged vigil↓'

***providing* /prə'vaidiŋ/** 14. so long as, if: `providing their clutch↑ is incomplete'

***rear* /riə*/** 79 to feed and look after, to bring up: `the same species by which she herself was reared'

***red-backed shrike* /'redbækt ' ʃraik/** 53 the bird *Lannis colluris*

***redstart* /'redsta:t/** 55 the bird *Phoenicurus phoenicurus*

***reed-warbler* /'ri:dwo:blə*/** 52 the bird *Acrocephalus scirpaceus* See Explanatory Notes, p. 69

***robin* /'robin/** 51 the bird *Erithacus rubecula*

***sedge-warbler* /'sed3wo:blə*/** 52 the bird *Acrocephalus schoenoboenus* See Explanatory Notes, p. 69

***simultaneously* /,simal'teinjəsli/** 41 at the same time: 'the cuckoo is able to keep several [nests] under observation simultaneously'

***specific* /spa'sifik/** 72 of a particular kind or species: 'a female cuckool selects a certain specific fosterer↑'

***strain* /strein/** 47 a group of organisms breeding within itself and having a common characteristic, such as the same type of host: 'strains or "gentes" ↑ of the European cuckoo↑'

subsequently **/'sʌbsakwantli/** 18 after this (i.e. after the event described just before) : 'Subsequently she destroys one or more of the fosterer'sI eggs'

systematically **/ˌsistə'mætikli/** I using a system or method: 'The female cuckoo↑' hunts systematically for the nests of her victims↓'

vantage **/'v*a*:ntid3/** 7 advantage: 'a point of vantage' See Explanatory Notes 6, p. 69

victim **/'viktim/** 2 a living organism that suffers injury or loss: 'The female cuckoo↑ hunts systematically↑ for the nests of her victims'

vigil **/'vid3il/** 5 a period of watchfulness: 'she begins a careful and prolongedi vigil'

visual **/'vizjuəl/** 8 concerned with sight, or vision: 'The visual stimulus'

wheatear **/'Wi:tiə*/** 56 the bird *0enantha oenantha*

whereas **/wɛə'ræz/** 58 while on the other hand: 'In Finland 68 percent of cuckoos'↑ eggs are blue, whereas in England they are almost all of the spotted type'

whinchat **/'wint ʃæt/** 56 the bird saxicola rubetra see Explanatory Notes, p.69

THE LAYING HABITS OF EUROPEAN CUCKOO

TEXT

The female cuckoo hunts systematically for the nests of her victims, which are generally small passerine birds—chiefly those which feed on insects. Quite often though, the linnet, which is a seed eater, is chosen. When she locates a pair building she begins a careful and prolonged vigil, observing the behavior and movements of the future fosterers from a point of vantage and sometimes gliding down to examine the nest at close quarters. The visual stimulus thus received appears to excite ovulation and the cuckoo's egg reaches maturity and is ready for laying about five days later, in fact shortly after the fosterers have themselves begun to lay.

Most birds deposit their eggs early in the morning, but the cuckoo does so in the early afternoon, a period at which the parent birds-providing their clutch is incomplete re most likely to be absent. She glides over the selected nest several times and then quickly alights in it and lays one egg directly into the nest, the entire action occupying no more than five seconds. Subsequently she destroys one or more of the fosterer's eggs, either by throwing them out or by crushing and eating them. Sometimes she carries one a considerable distance in her beak before disposing of it. When the cuckoo deposits her egg in a small domed nest with a side entrance it is impossible for her to enter and lay in the usual manner. The egg is then forcibly projected into the aperture from the bird's cloaca while she hovers immediately over the nest, a feat which might excite envy in an Olympic athlete. Some hold the view, that on certain occasions it is first laid on the ground, picked up in the cuckoo's beak and then dropped into the nest. Whether this sometimes happens is a matter of acute controversy. The majority of eggs (if not all) which are seen being carried by cuckoos are not their own, but eggs of the fosterers which they are about to destroy.

If conditions are favorable and there are enough breeding pairs of the right species of fosterer present, with incomplete or just completed clutches, the female cuckoo will continue laying eggs at intervals of about forty-eight hours until between fourteen and twenty have been deposited. One female

parasitizing meadow-pipits has been known to lay twenty-five eggs in one season. There are, however, rarely enough nests available in a single territory to make such a feat possible, although the cuckoo is able to keep several under observation simultaneously. On occasion she will destroy a whole clutch in order that a particular nest should be in a suitable condition to receive one of her eggs at a later date. Some species such as the great spotted cuckoo lays several eggs in the same nest, but the European cuckoo almost always distributes her eggs singly.

It is now a well-established fact that there are strains or `gentes' of the European cuckoo which, throughout their lives, parasitize only one particular species of small birds. In Britain there are relatively few regular hosts. The main fosterers used are the meadow-pipit, the robin, the pied wagtail, the hedge-sparrow, the reed-warbler and the sedge-warbler. In Germany a favorite host is the red-backed shrike, which is rarely, if ever, attacked in Britain. In Finland, on the other hand, the most popular fosterers are the redstart (which is rarely parasitized in Germany), the wheatear, the whinchat and the pied flycatcher, all of which lay blue eggs. In Finland 68 per cent of cuckoos' eggs are blue, whereas in England they are almost all of the spotted type. The number of eggs laid by individual cuckoos depends to a certain extent on the species of host favored. Thus, in Germany `red-backed shrike' cuckoos lay fewer eggs than `robin' cuckoos, for the breeding season of the former host is much shorter. Sometimes, when nests are scarce or an accident occurs, a cuckoo is compelled to lays in any nest she can find. Also some cuckoos are force eccentric and select unusual hosts and others fail to establish a territory and have to lay at random in a wide variety of nests. Thus, over fifty hosts have been recorded from Britain alone, but nevertheless the over-whelming majority of cuckoos in this country lays their eggs in the nests of the five or six regular fosterers mentioned above. It is, however, not known why a female cuckoo selects a certain specific fosterer for her initial laying, and generally continues to select similar fosterers throughout her period of reproductive activity. Why does a `meadow-pipit' cuckoo in Britain, for example, regularly select the nests of meadow-pipits rather than other small birds in which to lay her first egg? This is one of the unsolved mysteries of the cuckoo's life history. One possible explanation is

that she has a strong inclination to parasitize the same species by which she herself was reared. Much of the recent work on bird behavior has shown that certain sights and sounds and general situations can act as stimuli which release inborn and well formed patterns of behavior. Thus it is quite possible that the plumage and song of birds exactly similar to those which reared her and the general appearance of their nest `rings a bell', and acts as a `releaser' of this type (habitat imprinting which in this case might be called host imprinting), and thus stimulates the female cuckoo to foist her eggs upon them rather than any other species. But this is pure conjecture.

M. ROTHSCHILD and T. CLAY *Fleas, Flukes and Cuckoos* (1952)

EXERCISES

I. ***Re-write the following sentences using only that version*** **(a, b, c, or d)** ***which you think corresponds best with the text*****:**

1. The European cuckoo lays more than one egg in a fosterer's nest (*a*) always, (*b*) sometimes, (*c*) very seldom, (*d*) never.
2. Eggs seen carried by cuckoos in their mouths (*a*) are all fosterers' eggs, (*b*) may all be fosterers' eggs, (*c*) are not their own.
3. In Finland the eggs of cuckoos and their hosts tend to have (*a*) the same size, (*b*) the same shape, (*c*) the same colour.
4. Ovulation in the cuckoo probably occurs (*a*) as a result of the bird examining the future fosterers' nest, (*b*) periodically throughout the summer, (*c*) at the same time as in the foster-parents it has selected.
5. Cuckoos lay eggs (a) early in the morning, (*b*) on the ground, (*c*)in less than. five seconds.
6. A cuckoo usually selects every year as her host (*a*) the same bird, (*b*) the same species, (*c*) one of five or six species.
7. During one laying season the European cuckoo lays (*a*) about 25 eggs, *(b*) about one egg every two days, (*c*) one egg in every available nest.
8. A cuckoo destroys (*a*) one or more of the fosterers' eggs after laying her own in their nest, (*b*) one or more of the fosterers' eggs before laying her own in their nest, (*c*) all the fosterers' eggs except one.

III Re-*write the following sentences with suitable prepositions in the spaces*:

1. 1 A female cuckoo is able to keep several nests . . . observation .. . the same time.
2. She observes the behaviour of the future fosterers . . . a point of vantage, sometimes gliding down to examine the nest . . . close quarters.
3. She may carry a fosterer's egg a considerable distance . . . her beak before disposing . . . it.
4. Cuckoos usually parasitize only one particular species of bird . . . their lives.
5. She glides . . . the selected nest several times and then quickly alights . . . it.
6. The cuckoo hunts . . . the nests of small passerine birds, chiefly those which feed ... insects.

7. The female cuckoo will continue laying eggs ... intervals :.. about forty-eight hours until . . . fourteen and twenty have been deposited.
8. The number of eggs laid . . . individual cuckoos depends . . . a certain extent . . . the species of host favoured.
9. A female cuckoo will . . . occasion destroy a whole clutch in order that a particular nest should be . . . a suitable condition . . . a later date.
10. Some hold the view that ... certain occasions the egg is first laid .. . the ground, picked up . . . the cuckoo's beak, and then dropped .. . the nest.

III ***Re-write the following sentences replacing each italicized word by another single word of similar meaning*:**

1. Sometimes a cuckoo is *forced* to lay in any nest she can find.
2. We can perhaps *ascribe* the loss of the nuclei to an unfavourable environment.
3. During the normal life of the cell the proteins are in solution in the vacuole and are perhaps in the *process* of transit.
4. The zygote develops a thick coat and remains *inactive* for some time before it germinates.
5. The number of eggs laid by individual cuckoos depends to a certain extent on the species of host *preferred*.
6. At this stage there is only one nucleus *remaining* in the oogonium.
7. In higher plants food transport *appears* to take place in the phloem.
8. The amount of DNA in re*productive* cells is only half the amount in somatic cells.
9. Five divergent orders of reptiles *originated* from the Thecodontia.
10. The birds represent another major evolutionary shift *based* on a new adaptive type.

IV. ***In the following sentences replace the italicized words by one word of similar meaning, making any changes in word order that may be necessary*:**

1. The cuckoo is able to keep several nests under observation *at the same time*.
2. In sieve-tubes the middle lamella remains as a separation between cells *that are next to each other*.
3. Reduction of the chromosome number *takes place* when the zygote germinates.

4. The female cuckoo sometimes carries an egg quite a long way before *getting* rid of it.
5. The side walls of the sieve-tubes are thickened *to a small extent*.
6. *Fully developed* sieve-tubes no longer have a nucleus.
7. The companion cell may *grow longer*.
8. The cuckoo does not *bring up* its own young.
9. This is the period when the parent birds, *as long* as their clutch is incomplete, are most likely to be absent.
10. The sieve-tube cell vacuolates and *grows larger*.

V. *Re-write the following, putting the adverbs in brackets in suitable positions in the sentences*:

1. The fourth line of special adaptation forms the aquatic order Crocodilia, very successful in the past but today represented by 21 species. (only)
2. In England cuckoos' eggs are all spotted. (almost)
3. A cuckoo selects the nests of the same species throughout her life. (generally)
4. The amount per nucleus of DNA and of a protein termed histone are the same. (essentially)
5. The cuckoo destroys one or more of the fosterers' eggs. (subsequently)
6. The two largest groups involved in reptilian radiation are characterized by a diapsid skull. (both)
7. The cuckoo's egg is ready for laying after the fosterers have them-selves begun to lay. (shortly)
8. The cytoplasm comes away from the side walls, but not from the sieve plates, through which it passes in coarse strands. (comparatively)
9. The female cuckoo hunts for the nests of her victims. (systematically)
10. The individual cells are much longer and have no specialized cross walls but rounded-off endings. (just)
11. Some cuckoos fail to establish a territory and have to lay in a wide variety of nests. (at random)
12. D*yopteris* has similar sieve-tubes with more abundant lattices. (even)
13. The red-backed shrike is attacked in Britain. (rarely)
14. The amounts of RNA and of several other proteins vary from cell to cell. (considerably)

15. The female cuckoo glides down to examine the nest. (sometimes)
16. In Britain there are few regular hosts. (relatively)
17. Members of the two groups are called dinosaurs. (frequently)
18. The great majority of cuckoos in this country lay their eggs in the nests of the five or six regular fosterers that have been mentioned. (above)
19. The bottle methods give a sort of minimum and the diurnal curve a sort of maximum. (usually)
20. Pairs of light and dark bottles are suspended in the pond at the levels from which water samples were drawn. (then)

TOPIK 2

DESCRIBING BIOLOGICAL OBJECT

In this section you will learn how to describe object.

Read the example below.

ELEPHANT

Elephant is big mammals. With long nose and big ears it survives as a king of jungle. The long nose of elephant is used to take food and other activity such as clean its body. Its' long ear make it possible to hear voice for long distance. The picture above shows an African elephant. African elephant can be differing from Asian elephant. The size of African elephant is bigger than Asian elephant, the ears are larger, and the color is darker. Elephant is herbivore. It eats grass, vegetables and fruits. The trunk of elephant is the most valuable compare with other parts of its body. People hunt the trunk and they sell it in black market with high price.

Exercise:

Take one biological object (animal) and describe your object in English with your own words. See the example above.

TOPIK 2

DESCRIBING BIOLOGICAL OBJECT (PLANT)

ORCHID

Orchid is one of indigenous tropical country plant. There are many type of orchid found in Indonesia, one of them is Doritaenopsis orchid. This kind of orchid is a hybrid that typically created by crossing the Doritis orchid species and the Phalaenopsis orchid species. The flowers of Doritaenopsis orchid are large and long lasting. This kind of orchid is commonly very easy to grow under bright light but not in direct sun. As it can be seen in the picture, Doritaenopsis orchid have multiple flowering spikes.

Exercise:

Take one biological object (plants/or any other objects such as cells, leaf etc.) and describe your object in English with your own words. See the example above.

TOPIK 3

DESCRIBING GRAPH

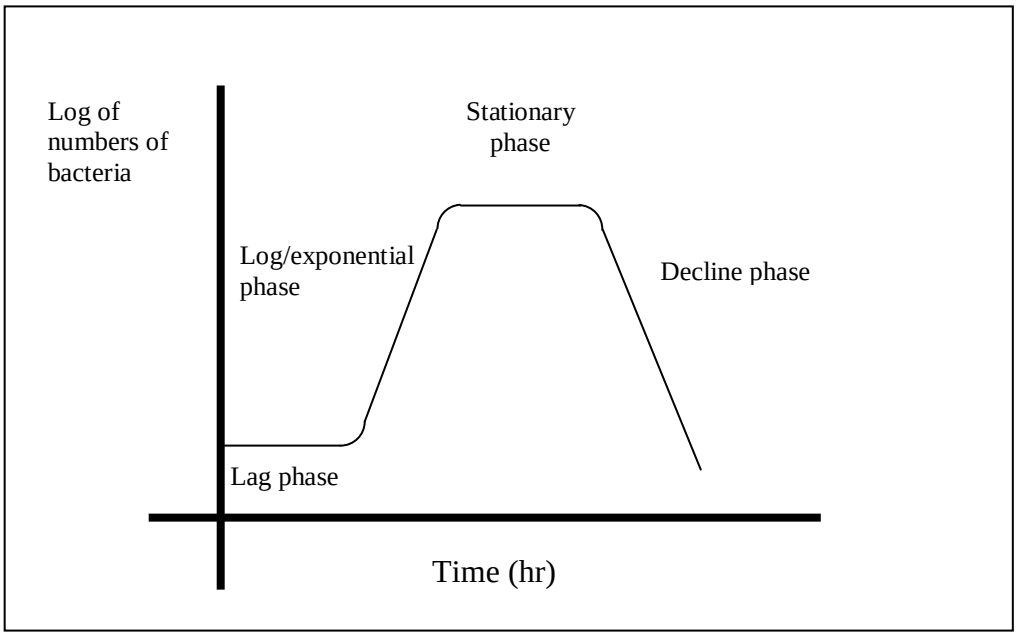
In this section you will learn how to describe graph.

Read the example below.

Bacterial Growth

Figure 1 shows bacterial growth. The growth of bacteria involves four basic phases. First phase is called lag phase. In the lag phase there is no change in number of cells as the bacteria do not reproduce in the new medium. Second phase is called exponential phase or log phase (i.e logarithmic). In log phase, the number of bacteria increases in great number. Cellular reproduction in this period of phase is the most active. In the third phase the number of dead cell is equal with the number of new cells. This period of equilibrium is called stationary phase where eventually the growth rate slow and the number of microbial death balance with the number of new cell makes the population stabilizes. The last phase is called death or decline phase. In this phase the number of death cell exceeds the number of new cells formed. This phase will continue until the population diminished.

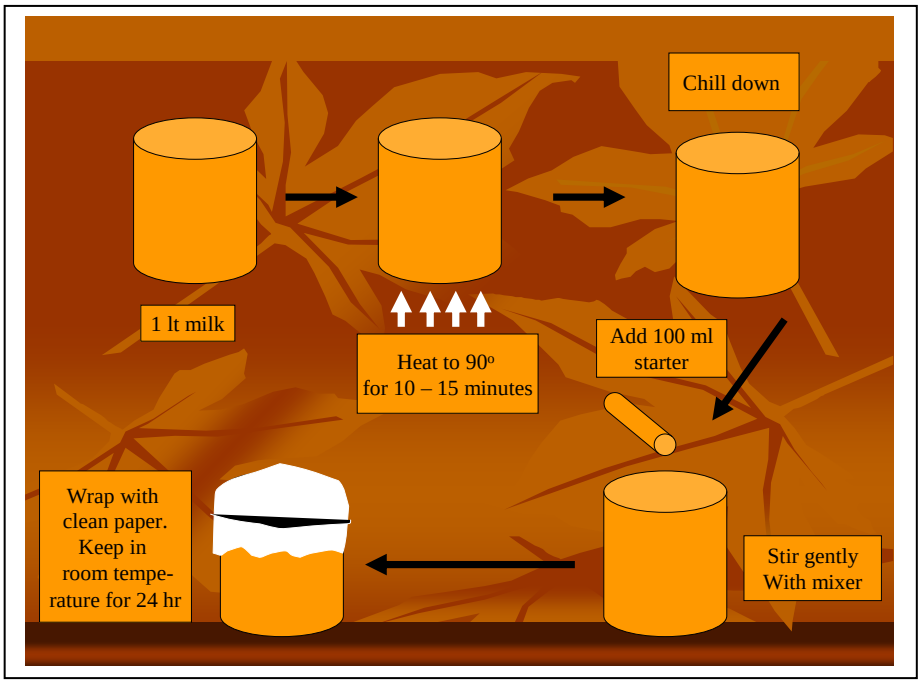
FIGURE1. BACTERIAL GROWTH



TOPIK 4

DESCRIBING PROCESS

The Process of Making Yoghurt



The Process of Making Yoghurt

Yoghurt is one kind of beverages which is made from fermented milk. There are two kind of bacteria get involved in making yoghurt, they are: *Streptococcus thermophylus* and *Lactobacillus bulgaricus*. The chart above shows a process of making yoghurt. First step of making yoghurt is heating 1 l milk in 90^{o}C for 10 – 15 minutes. After the milk heated, it is chill down. Second, add starter to the chilled milk (add 100 ml of starter for 1 l of milk). Stir milk with the starter gently by using mixer or spoon. Stainless spoon is avoided. Last step of the process is wrapping the mixture of milk and starter with clean paper and kept it in room temperature for about 24 hours. The milk will turn acid to the acidity of 4 if two kind bacteria in the starter work properly and it will smell nice.

Exercise:

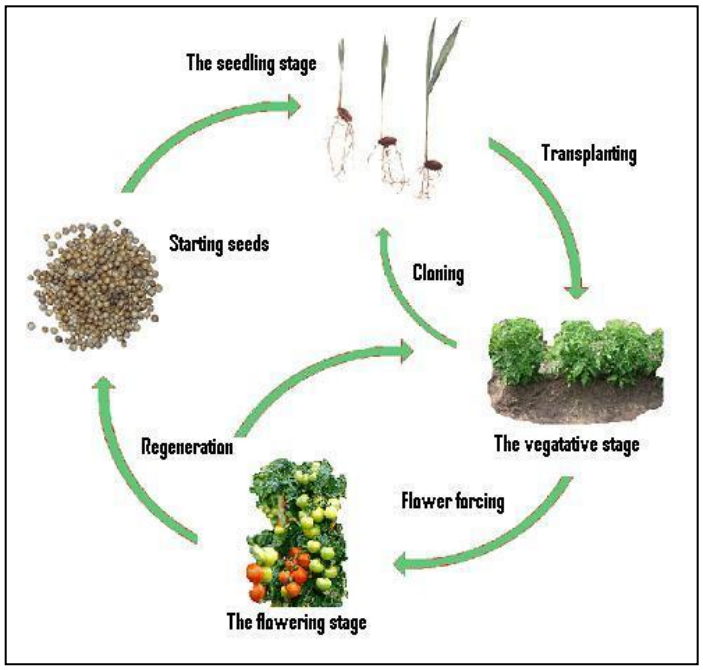
Take one chart of biological process/procedure and describe it in English with your own words. See the example above.

TOPIK 5

PLANT LIFE CYCLE

In this section you will learn how to describe plants' life cycle.

Read the example below.



The picture above shows us flowering plant life cycle. From the picture it can be seen that there are two ways of flowering plant regeneration. One way of regeneration is vegetative regeneration, in contrast to generative regeneration. Vegetative regeneration of flowering plant is carried out by cloning from plants' tissue; meanwhile generative regeneration is carried out by fertilization. Fertilization occurs in a flowering stage produce seeds that grow as new plants. In seedling stage, plants only have one or two leaves. Transplanting seeds makes plants grow bigger and taller with many leaves and continued with producing flower.

Exercise:

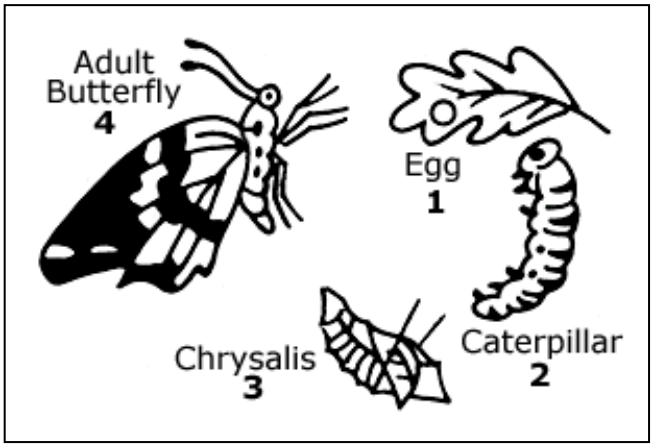
Take one example of plant life cycle. Describe the picture in English with your own words. See the example above.

TOPIK 5

ANIMAL LIFE CYCLE

In this section you will learn how to describe animals' life cycle.

Read the example below.



BUTTERFLY LIFE CYCLE

The picture above shows butterfly life cycle. Butterfly is one kind of insect which have complete metamorphosis. There are four stages to go through for butterfly to grow into an adult: egg, larva, pupa and adult insect. In first stage adult butterfly lays its egg on the leaves. Within a few days the egg hatches into larvae which usually called caterpillar. Caterpillar eats different food with butterfly as caterpillar eats leaves while butterfly eats nectar. In next stage, caterpillar becomes chrysalis or pupa. In the pupa stages, caterpillars do not eat anything. Within 12 days, the chrysalis becomes butterfly that eats nectar. Young butterfly grows to adult butterfly and it ready to lay its egg.

Exercise:

Take one example of other animal life cycle. Describe the picture in English with your own words. See the example above.

TOPIK 6

THE LIGHT AND DARK BOTTLE EXPERIMENT

VOCABULARY

[Scientific words used in the Text and elsewhere that are not explained in this vocabulary may be found in the general vocabulary on p. 205.]

***alkaline iodide* /ˈælkalain 'aiədaid/** I4 potassium /pə'tæsjəm/ iodide (KI) or sodium iodide (Na I)

***calibrate* /'kælibreit/** 21 to give a scale to: 'The volume of sodium thiosulfate† needed can be calibrated to indicate the concentration of oxygen in milligrams'

***count* /kaunt/** 49 See Explanatory Notes, p. 39

***curve* /ka:v/** 6o a line plotted↓ on a graph↓ whether it is curved or not: 'a diurnal↓ curve may be plotted'

data (*pl*.) /'deitə/ 78 factual information, usually in the form of figures: 'the quantity of data that can be gathered'

***determine* /di'ta:min/** 5o to find out: 'the phytoplankton↓ is removed by a filter that is "counted"↑ by a detector to determine the amount of radioactive carbon fixed↓'

***diurnal* /dai'ə:nəl/** 59 covering 24 hours: 'a diurnal curve↑ may be plotted↓'

***ecological* /i:kə'lod3ikl/** 79 adj./ecology /i:'kolәd3i/, the study of organisms in relation to their surroundings, or environment: 'ecological research' (Gk *oikos* a house, *logos* a branch of knowledge)

***elemental* /ˌelə'mentl/** 15 free, not part of a chemical compound:
'This treatment releases elemental iodine'

***fix* /flits/** 7 See Explanatory Notes, p. 38

***fixation* /fik'seiʃan/** 31 See Explanatory Notes 7, p. 38

***foil* /foil/** 5 metal in the form of a very thin sheet: 'One or more bottles are covered with aluminium foil'

***graph* /gra:f/** 4[2] a diagram expressing a mathematical relationship:
'A graph of bottle values plotted↓ against depth can be constructed'
(Gk *grapho* to draw)

***hypo* /'haipou/** 19 the popular name for sodium↓ thiosulphate: ‘the "hypo" used to fix↑ photographs’

***laborious* /lə'bo:riəs/** 72 requiring much repetitive work: ‘The some-what↓ laborious ... method of estimating oxygen described above’

***location* /lou'keiʃan/** 56 a place: ‘a new sampling↓, location'

***manganous sulfate*† /'mæŋgənəs 'sAlfeit/** 14 manganous sulphate, $MnSO_4$

***net* /net/** 27 resulting from what is gained minus what is lost: ‘the net photosynthesis (that is, net result of photosynthesis and respiration)’ See Explanatory Notes 25, p. 38

***oceanographic* /,ouʃano'græfik/** 52 adj./oceanography /,ouʃə'nogrəfi/, the scientific study of the sea: ‘This method is widely used in oceanographic work’ (ocean + Gk *grapho* to draw)

***phytoplankton* /'faito,plæŋktan/** 45 that part of plankton↓ which is composed of plants (Gk *phytos* a plant + plankton)

***plankton* /'plæŋktan/** 2 very small plants and animals that swim or float near the surface of the sea or lakes (Gk *plagktos* wandering)

***plot* /plot/** 42 to mark a position on a diagram or graph↑: ‘a graph of bottle values plotted against depth can be constructed’

***precision* /pri'si3ən/** 78 accuracy, exactness: ‘the.development of new methods that increase both the precision and the quantity of data↑’ procedure /pro'si:d3a*/ 75 the method of doing a thing: ‘Such electronic procedures are now in the experimental stage of development’

***resuspend* /'ri:səspend/** 52 to suspend, or hang, again: ‘it is not necessary to resuspend bottles in the sea’

***sample* /'sa:mpl/** 3 a specimen: ‘A portion of a sample of water from each of several levels’

***sampling* /'sa:mpliŋ/** 55 the taking of samples : ‘a new sampling location↑' See Explanatory Notes, p. 40

***sediment* /'sedimənt/** 68 the solid that may settle at the bottom of a liquid: ‘physical exchange of oxygen ... between water and sediments must be estimated’

***shift* /ʃift/** 35 a change of place or position: ‘a simple shift of decimal’

***sodium thiosulfate*† /'soudjəm ,Θaio'sAlfeit/** 20 sodium thiosulphate,

$Na_2S_2O_3$

***somewhat* /'sʌmwət/** 72 rather: 'The somewhat laborious↑ ...
method'

***stand by* /strænd bai/** 53 to wait in a state of preparation: ‘it is not necessary to ... stand by for 24 hours’

***string* /striŋ/** 12 a series of things connected by string or thread: ‘the string of bottles’

***sulfuric† acid* /sʌl'fjuərik 'æsid/** 15 sulphuric acid, H_2SO_4

***titrate* /tai'treit/** 18 to treat a chemical substance with a known
quality of another substance in order to determine the quantity of the former: ‘the brown water is then titrated in the laboratory by adding sodium↑thiosulfate†’

THE LIGHT AND DARK BOTTLE EXPERIMENT

TEXT

Light and dark bottles are suspended in a pond to measure oxygen changes resulting from the metabolism of the plankton organisms. A portion of a sample of water from each of several levels is placed in glass bottles. One or more bottles are covered with aluminium foil or black tape so that no light can reach the sample; these are called the ‘dark’ bottles, in contrast with the ‘light’ bottles that have no such cover. Other bottles are ‘fixed’ with reagents immediately so that the amount of oxygen in the samples at the beginning of the experiment can be known. Then pairs of light and dark bottles are suspended in the pond at the levels from which the water samples were drawn. At the end of the 24-hour period the string of bottles is removed from the pond and oxygen in each `fixed' by addition of a succession of the three reagents: manganous sulfate†, alkaline iodide, and sulfuric† acid. This treatment releases elemental iodine in proportion to the oxygen content. The water in the bottles is thus now brown in color†; the darker the color† the more oxygen. The brown water is then titrated in the laboratory by adding sodium thiosulfate† (the `hypo' used to fix photographs) until the color disappears. The volume of sodium thiosulfate needed can be calibrated to indicate the concentration of oxygen in milligrams or milliliters† per liter†; milligrams per liter is also parts per million, another way in which oxygen content of water is expressed.

The decline of oxygen in the dark bottles indicates the amount of respiration in the water column whereas the oxygen change in the light bottles indicates the net photosynthesis (that is, net result of photosynthesis and respiration); the two quantities added give an estimate of total photosynthesis or total food production for the 24-hour period, since oxygen production by green plants is directly proportional to fixation of light energy. One method of calculating photosynthetic rate of the water column on a square meter basis is to average values for each meter level and convert to oxygen per cubic meter (a simple shift of decimal since milligrams per liter = grams per cubic meter) ; the values for each meter level when added give an estimate of total oxygen production per square meter of pond surface. In the simplest case, if bottles

had been placed at o·5, I·5, and 2·5 meters deep then each pair could be considered as sampling the first, second, and third cubic meter; the sum of these would give an estimate for a column 3 meters deep. Alternatively, a graph of bottle values plotted against depth can be constructed and the area under the curve used to estimate the column.

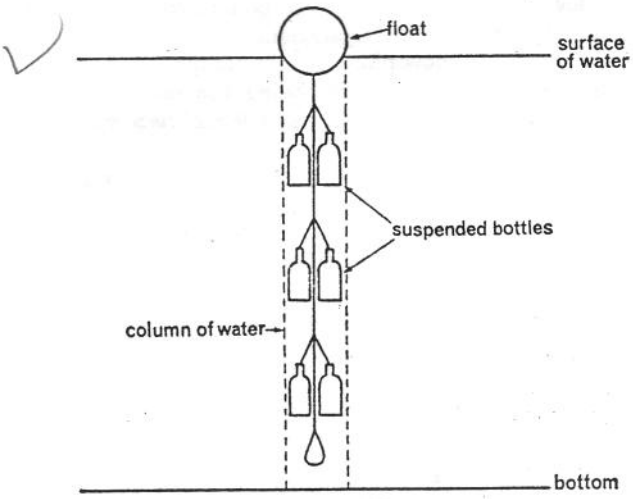
Where phytoplankton density is very low, as in large deep lakes or the open ocean, the sensitivity of the light and dark bottle method can be greatly increased by adding a radio-active carbon tracer to the bottles. After an interval of time the phytoplankton is removed by a filter that is 'counted' by a detector to determine, the amount of radioactive carbon fixed. This method, which indicates the net photosynthesis, is widely used in oceanographic work. At sea it is not necessary to resuspend bottles in the sea and stand by for 24 hours; the samples can be subjected to the light and temperature conditions of the sea on the deck of the ship as it moves to a new sampling location.

In another approach the whole pond can be considered as a dark and light bottle. If oxygen measurements are made at 2- or 3-hour intervals throughout a 24-hour cycle, a diurnal curve may be plotted that shows rise of oxygen during the day when photosynthesis is occurring and decline during the night when only respiration is occurring. The daytime period is equivalent to the light bottle and the night to the dark bottle. The advantage of this diurnal curve method is that photosynthesis of the whole pond including plants growing on the bottom (which would not be included in bottles) would be estimated. The difficulty is that physical exchange of oxygen between air and water and between water and sediments must be estimated to obtain the correct estimate for oxygen production of plants in the pond. Usually, the bottle methods give a sort of minimum and the diurnal curve a sort of maximum estimate.

The somewhat laborious but tried and true chemical method of estimating oxygen described above may soon be replaced by the 'oxygen electrode', which will permit continuous recording of oxygen in a bottle or in a body of water procedures are now in the experimental sage of development. As in any branch of science the development of new - increase both the precision and the quantity of data that can be gathered is one of the primary concerns of ecological research.

E. P. ODUM *Ecology* (1963)

WATER COLUMN



EXERCISES

I Rewrite the following statements to show that you fully understand the meaning of each. Expand them if necessary and use diagrams if these will help:

1. '... a graph of bottle values plotted against depth can be constructed and the area under the curve used to estimate the column.' (4.42)
2. 'The water in the bottles is thus now brown in color†; the darker the color† the more oxygen.' (4.16)
3. 'The decline of oxygen in the dark bottles indicates the amount of respiration in the water column whereas the oxygen change in the light bottles indicates the net photosynthesis . . .'(4.25)
4. 'At sea it is not necessary to resuspend bottles in the sea and stand by for 24 hours; the samples can be subjected to the light and temperature conditions of the sea on the deck of the ship as it moves to a new sampling location.' (4.52)
5. 'After an interval of time the phytoplankton is removed by a filter that is "counted" by a detector to determine the amount of radio-active carbon fixed. This method, which indicates the net photo-synthesis, is widely used in oceanographic work.' (4.48)

II Re-write the following with suitable prepositions in the spaces:

1. Oxygen production . . . green plant is directly proportional ….. fixation ... light energy.
2. The physical exchange of oxygen . . . air and water and . . . water and sediments must be estimated.
3. In the construction of the graph, oxygen values are plotted …. depth.
4. A portion . . . a sample of water ….. each of several levels is placed . glass bottles.
5. This treatment releases elemental iodine …. proportion ……. the oxygen content.
6. Pairs of light and dark bottles are suspended ... the pond ... the levels . . . which the water samples were drawn.
7. The object is to measure the oxygen changes resulting … the metabolism .0 . the plankton organisms.
8. Oxygen measurements are made….. 2- or 3-hours intervals ... a 24-hour cycle.
9. The oxygen content . . . water can be expressed ….. milligrams …..1 liter.
10. The samples can be subjected ... the light and temperature conditions … the sea … the deck of the ship as it moves … a new sampling location.
11. … the end of the 24-hour period the string of bottles is removed ... the pond and oxygen in each 'fixed' … addition … a succession ... three reagents.
12. The rate of photosynthesis in the water column can be calculated square meter basis … averaging values … each meter level and converting them oxygen …liter ... oxygen …cubic meter.

III *In the following sentences replace the italicized words by one word of similar meaning, making any changes in word order that may be necessary*:

1. The *method of doing things* in both experiments is fundamentally the same.
2. The physical exchange of oxygen between water and *solids settled on the bottom* must be estimated.
3. One or more bottles are covered with aluminium *metal in the form of a very thin sheet*.
4. The quantity of *factual and numerical information* that can be gathered may be increased.
5. This is a method *requiring much repetitive work*.

IV ***Write down the nouns that correspond to the following verbs used in the text*:** measure (4.1), release (4.15), titrate (4.18;, calibrate (4.21), add (4.29), convert (4.34), indicate (4.51), estimate (4.66), replace (4.73)

V ***The following sentences give instructions similar to those in the text, but the verbs are in the imperative* (*see p*. 41). *Re-write the sentences changing these verbs into the passive*.**

1. Add the two quantities in order to obtain a figure for total photo-synthesis.
2. Remove the string of bottles from the pond at the end of the 24-hour period.
3. Cover the bottles with black tape or similar material.
4. Plot bottle values against depth and use the area under the curve to estimate oxygen production in the water column.
5. Titrate the prepared solution in the laboratory with sodium thiosulphate.

VI ***Re-write the following sentences putting the italicized verbs into the passive* (*see p*. 40), *leaving out or changing other words when necessary or advisable*:**

1. E. Mirsky *has obtained* pure chromosomal material for analysis.
2. The decline of oxygen in the dark bottle *indicates* the amount of respiration in the water column.
3. We *know* very little of the manner in which the transport of food substances takes place.
4. The 'oxygen electrode' may soon replace the method of estimating oxygen described above.
5. Research workers *have found* that tetraploid cells have 12 x 10^{-9} milligrams of DNA per nucleus.
6. Removal of the phloem, the tissue containing the sieve-tubes, *brings* food conduction to a standstill.
7. In surface view we see that the pits are collected into groups or lattices.
8. Treating chromosomes with deoxyribonuclease *removes* the DNA but *leaves* a shadow of the chromosome structure.
9. The two quantities added *give* an estimate of total photosynthesis.
10. Workers *have shown* that chromosomes contain DNA, RNA and several kinds of proteins.

TOPIK 7
STATE THE OPINION

In this section you will learn how to make opinion from given statement.

Steps of making opinion:

1. State your opinion. You agree or disagree with the given statement. You also can write strongly agree or strongly disagree with the statement.
2. Give the reasons for your agreement or disagreement.

See example:

Statement

Snake is dangerous animal; therefore it should be vanished from our environment.

Opinion:

I disagree with the statement for some reasons given below. First if snake is considered to be dangerous for its poison, however not all snake produce poison. Therefore snake which does not produce poison is not dangerous for human or other living things. Second, snake plays an important role in ecosystem as a part of food chain. Snake is carnivore; it eats other living thing. If snake is vanished the environmental balance will be disturb with the increasing of other organisms that may be harmful for human or for environment. Third, snake can be used as a food source when other food source which usually human eat is decreasing. Other reason human can use snake to get money. Snake skin is very valuable as a material of bag, shoes, or jacket. For those reasons I disagree if snake has to be vanished from our environment.