18/MHS06/052
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MLS
ANA 204

Answers
Answer
1.Deserthabitatishometoavarietyofanimalsthathaveadaptedto surviveinharsh,dryconditions.Someofthemosticonicdesert animalshaveobviousphysicalcharacteristicsthathaveenabled them toadapttotheirenvironmentsomeoftheanimalsare:
? Camel' s
Theyareoneofthemostnoteworthydesertdwelers.Thelarge humpsoncamel'sbacksarekeytotheirsurvival.TheBactrian camelhastwohumpsonitsbackwhilethedromedarycamel hasonlyone.Bothtypesofcamelstorefatinthesehumpsthat canbebrokendownovertime.Duringlongjourneysthecamel usesthestoredfatforenergyandwaterandcangoforlong periodsoftimewithoutothersustenance.Theirwide,thick- soledfeetenablethem towalkonthehotsand.Distinctivethick eyebrowsandlongeyelashesprotecttheireyesfrom sandand theharshRay' softhesun.Thenephronsindesertmammal camelareequippedwithweldevelopedHenle' sloopand numberofJuxtamedularynephronsinkidneysisveryhigh, about35%(inmanthisnumberisabout15%).Desert

mammalsdonotreadilyfindwater,hencetheymustexcrete verylessamountofwater.Theyareabletoproducehighly concentratedurine;thekidneyisabletoconcentrateurine, therebyreducingwaterlossinthesummerwhenthediet producesverylitlewater.
? Gerbils
Haveseveralcharacteristicsthathavealowedthem toadaptto dryenvironments.Gerbilshaveanexcelentabilityfor thermoregulation,andhaveahighlevelofheattolerance.They h a v e a u n iq u e w a te r m e ta b o lis m in th a t th e y re q u ire v e ry lit tle watertofunction.Gerbilscanobtainsuficientwaterfrom their dietandtheirkidneyhaveahighlyeficienturineconcentrating capacitytoensureadequatehydration.Theratiooflong-loop nephronstoshort-loopnephronsingerbilsishigh.Ninety-six percentoftheirnephronsarelongloopwhichalowsthem to ef ficientlyconcentratetheirurine.Thedigestivesystem isalso veryeficientatabsorbingandretainingwaterandwatercanbe storedinfatcelayers.Gerbilsproduceandexcreteasmal amountofconcentratedurineanddryfaecesperday.
? Dipodomy
Theyaretruedessertanimalsandhaveanincrediblewater conservation system .This system al low s the rats to gain m ost o f th e ir w a te r s u p p ly fro m th e ir d ie t. W il lia m s (1 9 8 0 ) s ta te s th a t thekangarooratsrarelydrinkwateriffreelyaccessible,butin 2002, " DomelyandQuimby "

contendthattheseanimalswil

drinkwaterreadilyifoferedincaptivity.Kangarooratshave externalcheekpouchestostorefoodandlongtailsproneto degloving injuryifrestrained,andtheymusthaveaccessto dustbathstomaintainahealthyfurcoat. Somedesertanimalscanenduregreaterdehydrationthanhumans;a camel,forexamplemaylosewateramountingto30%ofitsbodyweight withoutseriousconsequences.Onlysweatthatevaporatesisusefulin coolingtheskin.Sweatthatrolsoforiswipedofdoesnotprovide significantcooling.Nevertheless,excesssweatdoesensurefulwetingof theskin.Theamountofsweatthatevaporatesfrom theskindemandson ambienttemperature,humidityandairvelocity.Evaporativecoolingismost eficientinahot,dry,windyenvironment. Manydesertanimalsareabletouseavailablewateropportunisticalyby drinkinglargequantitiesinshorttime.Thisabilityisproverbialinthecamel thatcantakeupto30%ofitsbodyweightinafewminutes.Camelsand otherdesertmammalshaveresistantbloodcelsthatcanwithstand osmoticimbalance.

2)Glomerularfiltrationbarier

Glomerularfiltrationisthefirststepinmakingurine.Itistheprocessthat yourkidneysusetofilterexcessfluidandwasteoutofthebloodintothe urinecolectingtubulesofthekidney,sotheymaybeeliminatedfrom your body.Theglomerularfiltrationbarierisahighlyspecialisedbloodfiltration interfacethatdisplaysahighconductancetosmalandmidsizedsolutes inplasmabutretainsrelativeimpermeabilitytomacromolecules.The glomerularfiltrationbarierhasseveralayers;Thefirstlayerisaglycocalyx

madeupofproteoglycansandanabsorbedlayerofplasmaproteinsthatis locatedbetweentheendothelialcelsandthecapilarylumen.Fenestrated endothelialcel lsfrom thenextlayer.

Thesecondlayeristhickglomerularbasementmembrane(GBM), whichissynthesizedbypodocytesandendothelialcelsandhasan inner layer com posed of col lagen type IV and lam inin sandw iched betweenlayersofhheparinsulfate.indiseasestatesismostbecarea.TheGF

1 changesinpatchangesinthehydrostaticpreTypeequationhere.pressureinthe glomerularcapilary(PGC),oncoticpressureintheglomeryalcapilary(Typeequation here.

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